

# AMATEUR

# RADIO

FEBRUARY 1990

RRP \$3

Special Data  
Reference Issue



THE WIA RADIO AMATEUR'S JOURNAL

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## Cover

Our Feb cover shows the antenna mast for 2m repeater VK6REX at Exmouth Gulf, and a view from the platform 30 feet from the mast's top. Seriously, VK6REX is sited on Tower Zero at the joint Australia — US Naval Communications Station Harold E Holt near Northwest Cape. At a height of 1,275 feet (389m) it is the highest repeater antenna on a man-made structure in Australia. Ken VK3AJU who took the photos said that he went to the tower top like a lion and came down like a lamb! The view however was magnificent!

# Many Hands

Many hands make light work, according to the old proverb. No doubt that the converse also applies, particularly to the activities of the WIA, almost all of which are critically dependent on voluntary effort to get them done. One of the more successful of these activities is WICEN, some of its doings being recorded from time to time in our occasional column of WICEN News.

WICEN really "gets going" in major national disasters such as bushfires and floods, cyclones and now even earthquakes. Until Newcastle a few weeks ago, we thought Australia had some kind of immunity from damaging earthquakes, but now we know better. In any of these emergencies, as soon as regular public communication links are overloaded or interrupted, WICEN may be called into action to provide emergency communications, either local or Australia wide.

Provision of such a volunteer service needs a substantial number of enthusiastic volunteers, having the right kind of equipment available at short notice, and trained in its use according to standard operating procedures.

## EDITOR'S COMMENT

**BILL RICE VK3ABP** EXECUTIVE EDITOR

This is achieved by provision on a regular basis of communications to various charitable or sporting activities. Here in VK3, the Great Victorian Bike Ride, the Red Cross Murray River Canoe Marathon, the Marlay Point Overnight Sailing Race, Walk against Want, and various Fun Runs and car trials are all helped by WICEN communications, and in turn WICEN participants obtain "hands-on" operating experience.

Would you like to be part of such an active and enthusiastic group? Find who your local WICEN area people are, and I'm sure they will welcome you. There are too many names for me to list here, but a few queries around the bands or channels should tell you what you need to know. I hope you can help WICEN more than I've been able to over the last few years. Every time an exercise is programmed, it always seems to clash with an urgent AR job like proof-reading or whatever!

Not only WICEN needs more volunteers. There is an urgent

need for Melbourne-based members of Executive. At least two are needed to take some of the

load off the too-few hands we have now. And someone qualified in accountancy would be more than welcome to fill the vacant position of Federal Treasurer. Few hands make heavy work. We know it only too well, but we'd love to experience the converse. It would be a pleasant change! ar

"YES, YES, OM - NOW YOU'RE 5/9+!"



Bill Martin VK2COP

## Wireless Institute of Australia

The world's first and oldest National Radio Society - Founded 1910  
Representing Australian Radio Amateurs - Member of the International Amateur Radio Union  
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<b>Intruder Watch:</b>	Gordon Loveday	VK4KAL	<b>WICEN:</b>	Bill Wardrop	VK5AWM

## Reference Issue

Following a practice started last year, this issue of *Amateur Radio* is the annual "Reference Issue".

In order to incorporate the number of pages required for the data section, the editors have had to cut down in other areas of the magazine.

That includes **WIA NEWS!**

## Amateur Radio Awards

One of the more difficult tasks of the Amateur Radio Publications Committee each year is the selection of the winners of the three magazine awards.

After much deliberation at the

## WIA NEWS

**BILL ROPER VK3ARZ GENERAL MANAGER & SECRETARY**

December meeting of the Committee, the following winners were selected for 1989.

The **Technical Award**, for the best technical article published during the year, was awarded to **Peter Stackpole, VK1RX** for his article "Sporadic E Propagation" that was published in the June issue of *Amateur Radio*. Peter received a cheque for \$100.00.

The **Al Shawsmith Journalism Award**, for the article on a radio theme considered best to display literary merit, was awarded to **Barrie Gillings, VK2DWC**. Barrie's article "They Say It Never Strikes Twice in the Same Place" appeared in the November issue of our magazine,

and he received an engraved wall plaque as well as a cheque for \$100.00.

The **Higginbotham Award**, for meritorious service to amateur radio generally, was awarded to **Eric Jamieson, VK6LP** because of his contribution to VHF/UHF. Eric's "VHF/UHF - An Expanding World" column has appeared in *Amateur Radio* each month over the past 20 years. A cheque for \$100.00 has been presented to Eric.

It is only through the efforts of many members of the WIA, such as these three award winners, that *Amateur Radio* magazine is such an interesting and informative magazine. Therefore, it is a

pleasure for the WIA to be able to recognise people such as these three in this manner, and tangibly reward their efforts.

Are you going to be eligible for any of these prestigious awards in 1990?

## First Devolved Exams

A note from Meg Box, VK5AOV, Secretary of the Adelaide Hills Amateur Radio Society, advises that on Saturday, 25th November 1989, the Adelaide Hills ARS conducted the first amateur radio examinations to be held by a body other than the DoTC.

Congratulations to the two persons who gained their Full Theory, the only successful candidates on this occasion.

## WIA DIVISIONS

The WIA consists of seven autonomous State Divisions. Each member of the WIA is a member of a Division, usually their residential State or Territory, and each Division looks after amateur radio affairs within their State.

Division	Address	Officers	Weekly News Broadcasts	1990 Fees													
VK1	ACT Division GPO Box 600 Canberra ACT 2601	President Ted Pearce Secretary Jan Burrell Treasurer Ken Ray	VK1ACP 3.570 MHz VK1BR 2m ch 6950 VK1KEN 70cm ch 6525 2000 hrs Sun	(F) \$65.00 (G) (S) \$52.00 (X) \$39.00													
VK2	NSW Division 109 Wigram St Parramatta NSW (PO Box 1068 Parramatta) 2124 Phone (02) 689 2417 Fax (02) 633 1525	President Roger Henley Secretary Peter Balnave Treasurer David Horstall (Office hours Mon-Fri 11.00 - 14.00 Wed 19.00 - 21.00)	(R Denotes repeater) Times 1045 and 1915 on Sunday 1.845 MHz AM, 3.595 SSB (1915 only), 7.145 AM (1045 only) 10.125 SSB (1045 only), 28.320 SSB, 52.120 SSB 52.525 FM 144.12 (SSB), 147.000 FM (R) 438.525 FM (R) 584.750 (ATV Sound) 1281.75FM (R) Relays also conducted via many repeaters throughout NSW.	(F) \$59.00 (G) (S) \$47.00 (X) \$33.00													
VK3	Victorian Division 38 Taylor St Ashburton VIC 3147 Phone (03) 885 9261	President Jim Linton Secretary Barry Wilton Treasurer Rob Hailey	VK3PC 1.840 MHz AM, 3.615 SSB, 7.085 SSB, 147.250 FM (R) Mt Macedon, VK3XV 147.225 FM (R) Mt Saw Saw VK3XLZ 146.800 FM (R) Mildura, 438.075 FM (R) Mt St Leonard 1030 hrs on Sunday	(F) \$65.00 (G) (S) \$52.00 (X) \$39.00													
VK4	Queensland Division GPO Box 638 Brisbane Qld 4001 Phone (08) 284 9075	President David Jones Secretary John Aarsse Treasurer Enc Fittock	VK4NLV 1.825, 3.605, 7.118, 14.342, 18.132, 21.175, 28.400, MHz VK4QA 52.525 regional 2m repeaters and 1296.100 9900 hrs Sunday VK4NEF Repeated on 3.605 & 147.150 MHz, 1930 Monday	(F) \$65.00 (G) (S) \$52.00 (X) \$39.00													
VK5	South Australian Division 34 West Thebarton Rd Thebarton SA 5031 (GPO Box 1234 Adelaide SA 5001) Phone (08) 352 3428	President Don McDonald Secretary Hans van der Zalm Treasurer Bill Wardrop	VK5ADD 1820 kHz 3.550 MHz, 7.095, 14.175, 28.470, 53.100, 145.000, FM (R) VK5KHZ 147.000 FM (R) Adelaide, 146.700 FM (R) Mid North, 146.900 FM (R) VK5AWM South East, ATV Ch 34 579.00 Adelaide, ATV 444.250 Mid North (NT) 555, 146.500, 0900 hrs Sunday	(F) \$65.00 (G) (S) \$52.00 (X) \$39.00													
VK6	West Australian Division PO Box 10 West Perth WA 6005 Phone (09) 474 2626	President Alyn Maschette Secretary Bruce Hedland Treasurer - Thomas	VK6KWN 146.700 FM (R) Perth, at 0930 hrs Sunday, relayed on 3.560, 7.075, 14.115, 14.175, 21.185, 28.345, 50.150, 438.525 MHz Country relays 3582, 147.350 (R) Busselton 146.900 (R) Mt William (Bunbury) 147.225 (R) 147.250 (R) Mt Saddleback 146.725 (R) Albany 146.825 (R) Mt Barker Broadcast repeated on 3.560 at 1930 hrs.	(F) \$56.00 (G) (S) \$45.00 (X) \$30.00													
VK7	Tasmanian Division PO Box 1010 Launceston TAS 7250	President Mike Wilson Secretary Bob Richards Treasurer Peter King	VK7ZWW 146.700 MHz FM (VK7RHT) at 0930 hrs Sunday relayed on 147.000 FM (VK7RAA), 146.750 (VK7RWN), 3.570, 7.090, 14.130, 52.100, 144.100 (Hobart) Repeated Tues 3.590 at 1930 hrs	(F) \$63.00 (G) (S) \$50.00 (X) \$38.00													
VK8	(Northern Territory) is part of the VK5 Division and relays broadcasts from VK5 as shown (received on 14 or 28 MHz).																
<table><tr><th colspan="3">Membership Grades</th><th rowspan="4">Three year membership available to (F) (G) (X) grades at fee x 3 times</th></tr><tr><td>Full (F)</td><td>Pension (G)</td><td></td></tr><tr><td>Needy (N)</td><td>Student (S)</td><td></td></tr><tr><td></td><td></td><td></td></tr></table>					Membership Grades			Three year membership available to (F) (G) (X) grades at fee x 3 times	Full (F)	Pension (G)		Needy (N)	Student (S)				
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Full (F)	Pension (G)																
Needy (N)	Student (S)																

These examinations were authorised for trial purposes under the new syllabus, which is not "official" until 21st February 1990, and DeTC will not issue a certificate or licence before that date.

The Adelaide Hills ARS Examinations Officer, Marshall Emm, VK5FN, reports that he was pleased with the way the examinations went. More details can be obtained from Club Corner in this issue of Amateur Radio.

## GM4VIR Receives MBE

Scottish radio amateur Alexander Anderson, GM4VIR, was awarded an MBE in this year's United Kingdom New Years Honours List for his work following the Lockerbie Air Disaster.

GM4VIR was co-ordinator of the regional branch of RAYNET, the amateur radio network, which was highly commended by the regional council for its communications after the crash.

It is great to see this public recognition of the valuable service the amateur service provides in times of disasters and emergencies.

## More Articles Needed

As readers of Amateur Radio magazine will realise, the articles published in this journal are almost entirely the volunteer efforts of members of the WIA.

Sometimes the editors are inundated with articles submitted for publication, and that has been the case over the past two years or so. Because of this plentiful supply of articles for publication, many authors have had to wait patiently for up to 12 months before seeing the fruits of their labours appear in print.

At other times, such as now, the reserve of articles is so low that the editors may have to consider reprints from other publications.

Therefore, now is the time for you to do what you had been thinking about for a long time, but kept putting off. Writing that article

for Amateur Radio magazine!

That different piece of equipment that you built and it worked.

That experiment with an antenna that surprised you with its results.

That useful modification you made to a commercial rig.

That exciting or humorous operating experience.

The list is endless! Share your ideas, discoveries and experiences with other amateurs. Feel the excitement of seeing your efforts in print.

Naturally, it would be ideal if your article was submitted to us in the form of a professional manuscript. But only a small percentage of articles is received in that form.

The Publications Committee has a team of competent technical editors to help you in knocking that idea of yours into shape. There is a professional draftsman available to redraw your circuits and diagrams if your drawing skills are below a publishable standard.

Send plenty of photographs with your article, preferably black and white prints, but the editors will consider virtually any style of photograph.

Experience the satisfaction of sharing your experiences and ideas with other amateurs, perhaps win an award, perhaps be republished overseas.

Incidentally, digressing for a moment, I wonder how many readers realise that Amateur Radio magazine is one of the most quoted and reprinted amateur radio magazines in the world. Each month I speed read a large number of amateur radio magazines that the WIA receives from overseas, in an attempt to keep abreast of what is happening in our hobby worldwide. Not a month goes by without me noting at least one reference to, or reprint of, an article originally published in our magazine.

So how about it? Dig out your pens, typewriters and cameras. Inundate the editors with a rush of articles for your magazine.

## Special June Issue

As mentioned last month, the June 1990 issue of Amateur Radio magazine will be a special "Test

Equipment" issue. The Editors are looking for articles on construction of test equipment, modification of test equipment, and test procedures for this special issue.

Articles need to be received at this office no later than the middle of March so that the articles can be prepared for publication in the June issue.

A prize will be awarded to the author of the test equipment article which is judged to be the best of those published in this special issue of Amateur Radio magazine. Negotiations are still continuing on just what that prize will be, but it will be very worthwhile.

Have you started writing your test equipment article for June issue of Amateur Radio magazine?

## December Front Cover

As anyone who has ever been involved with the publishing of Amateur Radio knows, if the magazine looks great, most readers accept it without comment.

The last few issues of the magazine, which we think are the best published for some time, have produced very little feedback from readers.

However, one of the things that makes the hobby of amateur radio so interesting is that radio amateurs are a very individualistic breed, and cover a broad spectrum of ideas and opinions.

Such was evident with comments received about the front cover of the December 1989 issue.

Many complimentary comments were received about this cover picture. However, we also received a few critical comments.

One comment was most scathing because we did not have a "Christmassy" front cover. Another objected to the "reds and browns" colours predominating as they are "angry and antagonistic colours". Apparently we should only use the "cool" colours of blues and yellows (the January cover was produced before this latter comment was noted). The Amateur Radio colour printing process uses only four colours,

and we do not always get the correct tonal reproduction of colours.

Yet another comment indicated concern that Peter Gamble was holding a cordless telephone and not an amateur handheld transceiver. The intent of this aspect of the photograph was to suggest that nearly all the time Peter used to spend enjoying the operating and construction pleasures of amateur radio is now taken up with the demanding and time consuming business of being Federal President of the WIA.

Incidentally, John Friend, VK3ZAB, the Amateur Radio photographer, takes a great photograph, doesn't he?

A final comment expressed disgust at the creation of a "personality cult" by publishing a photograph of the Federal President on the front cover of the magazine. Let me ask you this question. Did you know who was the President of your organisation before you saw the cover of December Amateur Radio magazine?

How does that saying go? "You can only please some of the people some of the time..."

## New Members Computer

The membership database computer is an essential part of the operations of the Executive Office of the WIA. Amongst a host of other tasks it maintains a database of members, prints address labels each month for Amateur Radio magazine, prints subscription reminder notices, processes payment of subscriptions, and combines WIA and DeTC records to produce the Call Book listings.

Many years ago, some of these tasks were done under contract by the Monash University EDP Department. When membership of the WIA grew to the stage where it was economically viable to purchase its own computer, after much deliberation a Cromemco CPM computer was purchased and installed.

This computer has given stirring service for many years, but old age has been catching up with it, and hardware failures were

becoming more of a problem.

The last straw occurred a few months ago when we advised that support for this computer in Australia was no longer available. This meant that, if certain components failed, there could have been delays of up to six weeks before replacement components were supplied.

After initial discussions involving amounts of about \$25,000 for a replacement computer and programming, the WIA finally purchased a new computer in November that is now up and running. The total cost for this new computer, streaming tape backup, and professional programming finally came to less than \$9,000.

For the information of the computer minded members, the new unit is an IBM clone AT with an 80286 processor running at 28 MHz. It has 1 megabyte of RAM on board, an 80 Mb voice coil hard disk, 1.2 Mb and 360 K floppy drives, a 60 Mb streaming tape cartridge backup unit, and uses a DOS version of Informix 3.3 for most of the membership database related functions.

Probably the most dramatic difference in the new system is that the time for generating the Amateur Radio address label file has been reduced from four hours on the Cromemco to 25 minutes on the AT.

Many of the programs had to be run overnight on the Cromemco. These programs can now be run during office hours, and the computer does not have to be left on each night.

Whereas the Cromemco used to take over five minutes to bring on line from a cold start, the AT can be processing a member query within 60 seconds of switch-on.

Besides this new membership database computer, the three IBM XT clones are still in constant daily use in the Executive Office for wordprocessing, accounting, and a variety of administrative database purposes.

## Support Our Advertisers

Any publication such as Amateur Radio Australia depends to a large degree upon its advertisers.

As well, the advertisers depend on our magazine.

The WIA is appreciative of the very worthwhile support given to our journal by our advertisers, particularly those advertisers who have been supporting Amateur Radio for many years.

Show your appreciation of these Amateur Radio advertisers by buying all your amateur radio requirements only from them. When you do so, let them know that you also appreciate their continued support for your magazine.

Remember, without these advertisers, Amateur Radio would not survive in its present format.

## Member Renewals

If for no other reason, 1989 will be remembered in WIA history as the year when the WIA publicly agonised over the decision to make a quantum increase in the membership fees. The necessity for the fees to "catch-up" arose because the below-CPI increases of the past 10 to 15 years had placed the organisation in a financially difficult situation.

Even so, despite the increase, full membership of most of the Divisions only costs \$1.25 a week; and concessional membership only costs \$1.00 a week.

With the debate that raged in print and on the air for several months, and the resultant changing of decisions, no one can say that the outcome was not the result of much deliberation, anguish and public discussion.

Each year, when the bulk of members subscription renewals become due, generally about 400 members do not renew, but these dropouts are generally compensated for by the new members gained during the year. Some members advise that they are no longer active in amateur radio for a variety of reasons, some find that in determining their financial priorities the WIA has to miss out, and some resign because they are not happy with some aspect of the WIA.

In the past, most membership renewals were received without comment, and most resignations become known simply because of

non-payment of the subscription fee. This year, no doubt because of the long drawn out public debate on the fee increases, it is different. Many members renewing are attaching notes and letters to their remittances. Many more than is usual, of those who are resigning, are letting the WIA know why.

Even though the Executive Office is closed at the time I am writing this, 1619 items of mail have been processed in the past four days. Peter Gamble, the Federal President, and Executive member Brenda Edmonds, have spent two full days in the office this week helping the Executive Office staff in replying to some of these letters.

Many of the letters are encouragingly supportive, such as this one....

"Glad to see that the fee has been raised to be more in line with the professional service that we receive from the WIA.

Amateur Radio can be great fun but could not exist without serious control and representation by WIA, RSGB etc.

Please debit my Visa card with membership \$65.00, donation to funds \$25.50." Others offer several constructive suggestions and criticisms and, regrettably, a couple have been abusive and offensive, such as the ungentlemanly amateur who sent back his renewal notice with "go to hell" scrawled across it. **ar**

## DOTC Interference Investigation Update

The introduction of a \$60 up-front charge by DOTC before it investigates individual complaints of broadcast radio and TV reception difficulties will be introduced soon. A recent amendment to the Broadcasting Act passed by Federal Parliament has cleared the way for DOTC to make a charge before it investigates such complaints.

The background to this move was fully explained in AR magazine last July "Interference, spectrum pollution and reception problems".

DOTC has sent copies of its new booklet "Better Television and Radio Reception: Your Self-held Guide" to about 2500 technicians and antenna installers around Australia. This is aimed to boost their knowledge of the causes of reception difficulties, often mistaken for being the result of interference. The booklet was reviewed in the December edition of AR magazine and is available free from DOTC state offices and district radio inspectors.

## Phone Patch Deregulation

The interconnection of radio equipment with Telecom's telephone network has been deregulated, but there is still a requirement to use only approved interconnect devices. Telecom has advised that charges for the interconnection of radiocommunications systems will no longer be levied. This followed a decision made by Austel, the independent regulatory body for telecommunications. Telecom had charged amateur radio stations using phone patch facilities an access charge of \$2 a month.

Approval from Telecom for connection to its network is no longer required. However all radio amateurs are reminded that only authorised interconnection devices can be used for phone patch. Among the permitted equipment is the WIA Amateur to Telecom line isolation unit (LIU) — a homebrew unit which meets the technical standards needed to isolate radio equipment from the telephone line. The WIA is required to test all of the LIU's to ensure they use the correct components and are constructed in accordance with the required standards.

Around 50 LIU's have been built by radio amateurs, and passed for an approval number after the WIA testing procedure.

**JIM LANTON VK3PC**

**ar**

# A FEW TIPS ON THE DESIGN OF THE NOISE BRIDGE

LLOYD BUTLER VK5BR  
18 OTTAWA AVE PANORAMA 5041

## Introduction

This is not intended to be a complete presentation on the noise bridge, which has been well described in amateur radio journals and in particular in articles in the March, April and May 1981 issues of *Amateur Radio*, by Bob Slutzkin VK3SK. The article does present a few ideas which result from my own experimentation with the noise bridge, and discusses a different type of signal source for the bridge.

## The Typical Circuit

A typical noise bridge circuit is that of the Palomar model shown in figure 1. In this and most other noise bridges, a continuous wide band spectrum of noise is generated by passing current through a semiconductor diode. The noise is amplified in a number of transistor stages to a suitable level as a source for the AC bridge. The advantage of the wideband noise is that no tunable oscillator is required and measurement of resistance and reactance can be carried out at the frequency desired, without adjustment of the source. Measurements of the resistance and reactance of an antenna system can easily be made at the actual operating frequency of the antenna.

The output of the bridge is detected by a radio receiver tuned to the operating frequency and the bridge is balanced for a minimum in the noise level output of the receiver or for a dip in its 'S' meter reading.

In using the bridge to measure antenna constants, there is often a problem in resolving the precise null point of the bridge because, as the null is approached, the noise from the bridge is masked by incoming noise received by the antenna. The minimum in level of noise from the bridge is more easily identified, in the presence of antenna noise, if the source is heard as an audio tone. A circuit of a bridge signal source, which adds a tone component, has been published in recent issues of the *ARRL Handbook* and in the October 1987 issue of *QST*. In this source, the noise is modulated by an NE555 timer, free running at 1000 Hz. According to the *QST* article, the tone is heard in the presence of noise when adjustment of the bridge approaches the null. In the following text, I will introduce a differ-

ent type of wideband signal source which, when detected, produces a strong audio tone in the receiver output.

## A Different Signal Source

For the source introduced, the signal is initiated from a 500 Hz square wave oscillator which switches state at high speed to generate harmonics well into the upper HF spectrum. In a perfect square wave, the harmonics are of odd order so that harmonic frequency components are generated at 1000 Hz intervals of frequency. The amplitude of each harmonic component is inversely proportional to its harmonic order so that the third harmonic component is one third the amplitude of the fundamental component, the fifth harmonic component is one fifth the amplitude of the fundamental component and the 'n'th component is one 'n'th the amplitude of the fundamental component. Given that  $\Theta = 2\pi ft$ , we can express the fundamental and harmonic components as follows:

$$A = a_0 \sin \Theta + \frac{a_1 \sin(3\Theta)}{3} + \frac{a_2 \sin(5\Theta)}{5} + \dots + \frac{a_n \sin(n\Theta)}{n}$$

The first term represents the fundamental frequency and each following term represents a harmonic with its relevant denominator dividing by 3, 5 or 'n' & etc.

If we feed the square wave through a differentiating network, we can represent this operation by mathematical differentiation in the previous expression of A with respect to  $\Theta$ . The derivative of  $\sin(n\Theta)$  is simply  $n \cdot \cos(n\Theta)$  and thus our differentiated expression

becomes the following:

$$\frac{dA}{d\Theta} = a_0 \cos \Theta + \frac{3a_1 \cos(3\Theta)}{3} + \frac{5a_2 \cos(5\Theta)}{5} + \dots + \frac{na_n \cos(n\Theta)}{n}$$

It can be seen that in each harmonic term of the expression, the new multiplier in the numerator cancels out the denominator and therefore all harmonic terms have the same amplitude as the fundamental term.

As demonstrated in the previous paragraph, feeding the square wave output through a differentiating network provides a continuous spectrum of equal amplitude harmonic components spaced at 1000 Hz intervals. The network is a simple circuit of series capacitance and shunt resistance and in achieving differentiation, all frequency components are attenuated to the same very low level as that of the highest frequency component. Because of the low level, considerable amplification is needed, following the differentiating network, to raise the level sufficiently to operate the bridge. The system of square wave generation, differentiation and amplification, as a source to feed the bridge, is shown in the block diagram, figure 2.

To carry out the functions described, a single High Speed CMOS Hex Inverter Type 74HC04 is used as shown in figure 3. The reason for using a CMOS device will be explained when amplification is discussed. The high speed version was selected to handle frequencies well into the high frequency end of the HF band. Inverter sections A and B are used in an astable multivibrator circuit which generates the 500 Hz square wave. Inverter C is a buffer stage which drives the differentiating network C5-R5, the output of which feeds an operational amplifier type of circuit made up of inverters D, E and F.

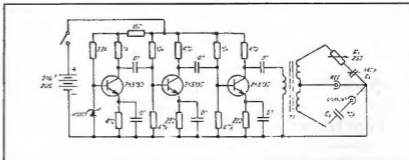


Figure 1 Palomar noise bridge using diode as noise source

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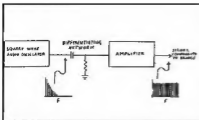


Figure 2 Wideband signal source produced from differentiated audio square wave

Operation of the amplifier requires further explanation. Use of CMOS inverters for linear amplification was described in Dick Smith Electronics publication *Experimental Electronics* (Aug-Sept, 1984). If negative feedback is applied from the complementary output stage of a CMOS inverter back to its input gate, the output stage operating point centres at a potential between that of its two supply rails and the inverter can operate in a linear mode. The feedback can be applied across one inverter or three inverters for correct phasing. It is important that, as far as DC potentials are concerned, the input gate must float and this is the purpose of C8 in my circuit. The three inverters are connected in tandem to form an operational amplifier type circuit in conjunction with R4 and R6. The resistance ratio of these resistors determines the low frequency gain.

The Dick Smith publication made no reference to the high speed version of CMOS but I soon discovered that, connected as a linear amplifier, this version had a great desire to oscillate in its own right around 50 to 100 MHz. To 'tame the beast' and prevent a response peak at high frequencies, components C4, R7, L1 and C7 were added.

The discussion has evolved around a perfect 500 Hz square wave oscillator with only odd harmonic components which, when they beat together in an AM detector, produce 1000 Hz tone. In practical operation, the oscillator shown delivers quite a high level of even harmonics which beat with the odd order harmonics to produce 500 Hz. The audio tone thus sounds more like a 500 Hz tone with composite harmonics.

One aim in designing the circuit was to provide the complete signal source with the one only integrated circuit package shown. This aim was not quite achieved. My original home built noise bridge used the diode noise source based on the type of circuit shown in figure 1. The new tone based source proved to have lower level output than the original noise source and I corrected this level anomaly by feeding the new source through the last transistor amplifier stage of the original noise source. This transistor stage is shown in figure 3 as part of the new complete circuit diagram.

A characteristic of this type of signal source

is that, when detected by a radio receiver, the receiver must be set up for AM detection to hear tone. If the receiver is set for single sideband operation with a beat oscillator, noise is heard but not tone. The same characteristic applies to the modulated noise type of signal source which was discussed earlier.

## The Bridge Coupling Transformer

Some care has to be taken in making the coupling transformer which must have an accurately balanced secondary to feed the two halves of the bridge. A 9mm toroidal core, with a primary winding of 10 turns and two secondary windings of 10 turns, does the job nicely. Ferrite material with a permeability around 120 is suitable but this is not critical. To obtain high coupling efficiency in such a transformer, it is normally necessary to wind the primary and secondaries together in multi-filar form, that is, the three winding wires are first twisted together and then wound on the core as one. Unfortunately, this results in a high capacitance between the primary and secondaries and as the primary is unbalanced, the secondary windings have a reflected capacitance unbalance.

The primary to secondary capacitance can be reduced by winding the primary on one side of the toroidal core and bi-filar winding the secondaries on the opposite side. This is illustrated in figure 4. Unfortunately, this method of winding introduces a high leakage inductance which is reflected back in series with the primary and causes some signal loss. For this particular application, the signal loss is a worthwhile trade-off to reduce capacitance unbalance in the secondaries.

## Bridge Components

A general circuit arrangement for the bridge is included in figure 3. Actual capacitance

values are not critical as precision is defined by calibration after construction. The main requirement is that the fixed capacitor in series with the 'unknown' has a value near half the maximum capacitance of the variable capacitor in the opposite bridge arm. This ensures that balance for zero reactance at the 'unknown' occurs near the centre of the variable capacitor tuning range and that both positive and negative reactance at the 'unknown' can be balanced either side of the zero.

Because antenna feeder systems are normally arranged to reflect low values of antenna resistance, a low resistance non inductive potentiometer is required to provide good resolution in the variable resistance section of the bridge. Obtaining a suitable potentiometer can be a problem. My original bridge used a 1000 ohm carbon potentiometer with a logarithmic scale and the expanded part of that scale was used to give fine resolution of the low values of resistance. This potentiometer eventually became noisy and I replaced it with a good Allen Bradley 100 ohm linear carbon potentiometer which I had luckily obtained. To extend the range above 100 ohms, I connected in series a small rotary switch which selected one, or any number up to seven, additional 100 ohm resistors. This provided an adjustable range of 0 to 500 ohms. In figure 3, the variable resistance is represented by R12 shown for simplicity as a single resistance.

## Assembly

There are several inexpensive boxes made of light gauge aluminium which are distributed by Dick Smith Electronics. The smallest of these nicely houses the noise bridge unit. The potentiometer, variable capacitor, battery switch and connectors for the 'unknown' and the receiver input, must be accessible and are mounted on the box itself. The remainder of the components can be fitted on vero or other type of blank circuit board which is fitted inside the box. The unit is powered by a 9V battery. It is a good idea to wire in an LED

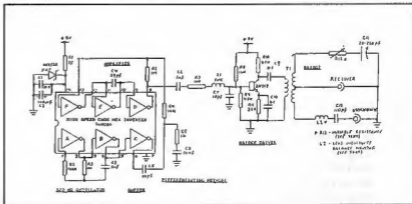


Figure 3 Bridge with wideband signal source to produce a tone on AM demodulation

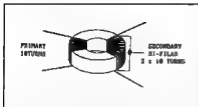


Figure 4 Method of winding primary & secondary on toroidal core

indicator across the power rails to draw attention to the battery load being on. I find that batteries often have to be replaced because I forget to turn equipment off rather than because of extended usage!

Wiring leads in the bridge circuit should be kept as short as possible to minimise lead inductance although it is difficult to avoid some long leads in connecting up the potentiometer and the variable capacitor.

## Lead Inductance In The Bridge Arms

Wiring leads in the bridge arm containing the potentiometer and the variable capacitor are likely to be much longer and have much higher inductance than those in the bridge arm containing the connector for the 'unknown'. If the reactance zero setting is to be at the same point on the calibration scale for all frequencies, the inductance in the 'unknown' bridge arm must be increased by lump inductance to make the inductance in both arms equal. I was able to achieve this by adding a small coil of 22 gauge tinned copper formed around a knitting needle. In my own case, the adjustable bridge arm had been complicated by the variable resistance arrangement and had accountable inductance.

To trim the coil, I started with about 12 turns which over-compensated the circuit. Turns were trimmed off until the zero reactance point of the variable capacitor was identical for the extreme frequencies of 2 MHz and 30 MHz. This was done with a 50 ohm resistance across the 'unknown' terminals and the variable resistance set for balance of the 50 ohms.

## Calibration

Calibration of the variable resistance arm of the bridge is a necessary requirement but is quite easy to carry out. Calibration of the variable capacitance to provide a reactance scale is not quite so straight-forward. If the use of the bridge is only to match up the antenna tuner to reflect 50 ohms resistance to the transmitter, calibration of the capacitance scale might not be needed.

The scale of the variable resistance arm can be calibrated by direct measurement of

the potentiometer resistance using a standard DC or low frequency AC resistance bridge or using a digital multimeter set to the ohms scale. The ohms scale of a moving coil multimeter can also be used but this should first be checked against some reference fixed resistors so that correction for any inaccuracy can be made (Moving coil multimeters are not renowned for their high accuracy on the ohms scale.)

Another method of calibrating the variable resistance scale is to operate the bridge at a normal HF operating frequency and substitute different values of fixed resistor connected as the 'unknown'. In this case, as for normal operation of the bridge, both resistance and capacitance variables are adjusted for a noise null. The capacitance null is the adjustment for zero reactance and from this adjustment, the zero point can be marked on the reactance scale. The resistance scale is marked as defined by the substitution resistors, any additional AC resistance component in the bridge circuit is taken into account and if carried out at extremes of frequencies, it can show up any AC resistance component which varies with frequency. If a good quality carbon or cermet potentiometer is used, this should not occur.

The general practice in noise bridges has been to calibrate the variable capacitor in terms of plus and minus capacitance, as referred to the zero reactance point and provide a calibration curve of reactance at 1 MHz against capacitance. For my own bridge, I thought it was a better idea to eliminate the calibration curve and mark the dial calibration directly in values of reactance at 1 MHz.

To calibrate the reactance scale, the receiver is set to 1 MHz and inductors and capacitors in a range of fixed values are substituted in turn as the 'unknown'. The inductors used set points of positive reactance and capacitors used set points of negative reactance. Using the inductors, both the variable capacitance and variable resistance are ad-

justed for a null. The variable resistance is needed to balance the loss resistance of the inductor. Using the capacitors, the variable resistance is set to zero, assuming negligible resistance loss in the capacitors.

Tables A and B list preferred values of inductors and capacitors which individually, or in combination with others, give a reactance at 1 MHz close in value to suitable incremental calibration marks. Fixed inductors are not usually a plentiful item in the radio shack and hence the inductors have been restricted to four different values which, in some cases, are series connected to obtain the reactance required, the error factors in using the precise preferred values are also given in the tables. In using 'off the shelf' inductors and capacitors, with a given manufacturer's tolerance, a general accuracy of 10% might be expected. For the purpose of tuning up antennas, this accuracy is probably adequate.

## Some Final Remarks

The noise bridge is a very useful addition to the radio shack to assist in matching the aerial system and to determine what impedance components are seen looking into the antenna feeders. It is a simple device which can easily be built by the most inexperienced radio amateur. In its testing and calibration, it is an excellent device for the novice to get the feel of what AC resistance and reactance is all about. It can be calibrated by simple substitution of 'off the shelf' resistors, capacitors and inductors so that other test equipment is not needed.

In providing a few tips on the noise bridge, I have introduced a new idea for a wideband signal source which demodulates as an audio tone rather than wideband noise. Perhaps others, who already have a noise bridge, might like to experiment with this idea.

### Table A

Selection Of 'Off The Shelf' Inductors

Calibration Reactance ohms	Preferred Inductor Value $\mu$ H	% Error
100	15	6% low
200	33	4% high
300	47	1.6% low
400	47 + 15	3% low
500	47 + 33	0.5% high
600	47 + 33 + 15	0.6% low
700	100 + 15	3% high
800	100 + 33	4% high
900	100 + 47	3% high
1000	100 + 47 + 15	2% high

### Table B

Selection Of 'Off The Shelf' Capacitors

Calibration Reactance ohms	Preferred Capacitor Value pF	% Error
100	1500	6% high
200	820	3% low
300	560	5% low
400	390	2% high
500	330	3% low
600	270	2% low
800	200	0.5% low
1000	150	6% high
1500	110	3.5% low
2000	82	3% low
3000	56	5% low

# WIA 1990 DATA LIST

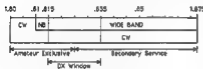
BRUCE R KENDALL VK3WL DATA EDITOR

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## Band plans for the Amateur Radio Service

### 1. The MF Band

- 1.1 The 1.8 MHz Band (160 Metres)  
1.800 - 1.875 MHz

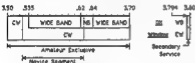


1.870 +/- 4 kHz

Avoid these frequencies

### 2. The HF Bands

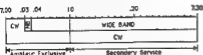
- 2.1 The 3.5 MHz Band (80 Metres)  
3.500 - 3.700 MHz and  
3.794 - 3.800 MHz



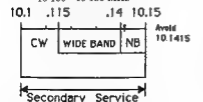
3.794 +1 kHz

Avoid these frequencies

- 2.2 The 7 MHz Band (40 Metres)  
7.00 - 7.300 MHz



- 2.3 The 10 MHz Band (30 Metres)  
10.100 - 10.150 MHz



10.1415 +/- 4 kHz

Avoid these frequencies

- 2.4 The 14 MHz Band (20 Metres)

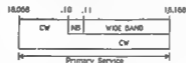
14.000 - 14.350 MHz



- 14.100 +/- 500 Hz Beacon Guard Band  
14.230 SSTV calling frequency  
14.250 FAX calling frequency  
14.095 - 14.112 Packet Radio (NB: Avoid beacons 14.100)

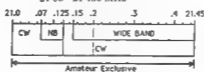
- 2.5 The 18 MHz Band (17 Metres)

18.068 - 18.168 MHz



- 2.6 The 21 MHz Band (15 Metres)

21.000 - 21.450 MHz

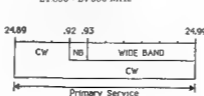


- 21.150 +/- 500 MHz IBP Beacon Guard Band

21.340 +/- 5 kHz SSTV

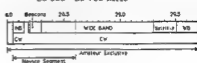
- 2.7 The 24 MHz Band (12 Metres)

24.890 - 24.990 MHz



- 2.8 The 28 MHz Band (10 Metres)

28.000 - 29.700 MHz



- 28.190 - 28.200 IBP Beacon Segment

28.200 - 28.300 Existing Beacons until 1 Jan 1990

28.680 +/- 5 kHz SSTV

29.300 - 29.510 Satellite Down Link

29.510 - 29.700 Wide Band (FM)

29.520 - 29.680 FM Repeater Inputs (Note 1)

29.600 FM Simplex

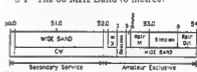
29.620 - 29.680 FM Repeater Outputs (Note 2)

### Note: 1

Four repeater channels have been allocated, spaced at 20 kHz with 100 kHz offset.

### 3. The VHF Bands

- 3.1 The 50 MHz Band (6 metres)



- 50.000 - 50.000

Restricted use segment (Note 1)

50.000 - 50.100

CW

50.000 - 50.010

EME

50.100 - 50.000

CW/Phone

50.110

DX Calling Frequency

52.000 - 52.010

EME

52.010 - 52.050

DX CW

52.025

CW calling frequency

52.050

MS calling frequency

52.050 - 52.100

DX CW/Phone

52.075

RTTY calling frequency

52.100

Phone calling frequency (primary)

52.100 - 52.300

CW/Phone

52.200

Phone calling frequency (secondary)

52.300

SSTV calling frequency

52.300 - 52.400

Beacons - secondary

(Note 3)

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52 400 - 52 500	Beacons primary (Note 3)
52 500 - 52 600	General all modes
52 525	International FM Calling
52 600 - 54 000	FM simplex and repeaters (Note 2)
52 600 - 52 975	Repeater inputs allocated two/state
53 000 - 53 400	General all modes
53 400 - 53 575	Simplex frequencies
53 500	National FM calling
53 600 - 53 975	Repeater outputs

**Notes:**  
1) DOC provided the conditions for use of 50-52 MHz in a revision to DOC71 as follows.

Amateur stations are permitted to operate within this band subject to the conditions set out below

- (i) No interference is caused to the reception of channel 0 transmissions;
- (ii) In New South Wales, Victoria, Queensland and Tasmania operation is restricted to:
  - (a) the sub-band 50.05 to 50.20 MHz;
  - (b) locations outside the following minimum radial distances from:

Television channel 0 main stations 120 km  
Television channel 0 translators stations 60 km

Television translator stations with channel 0 inputs 60 km

(c) emission mode 200HA1A with a maximum transmitter power of 100 watts pY; and

(d) emission mode 4K00J3E with a maximum transmitter power of 100 watts pX.

(iii) In the Australian Capital Territory operation is restricted to:

- (a) the sub-band 50.05 to 50.20 MHz;
- (b) emission mode 200HA1A with a maximum transmitter power of 100 watts pY; and

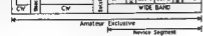
(c) emission mode 4K00J3E with a maximum transmitter power of 100 watts pX.

2) The repeater split is 1 MHz and channel spacing 25 kHz

3) The beacon frequencies are allocated in accordance with the beacon plan on a state basis (ie VK1, 52 410; VK2, 52 420 MHz etc).

### 3.2 The 144 MHz Band (2 metres)

144.0 - 148.0 MHz



144.0 - 144.01	EME
144.01 - 144.05	DX CW
144.05	CW calling
144.050	MS calling
144.05 - 144.10	DX CW/Phone
144.075	RTTY calling frequency
144.10	Phone calling (primary)

144.20	Phone calling (secondary)
144.30	SSTV calling
144.40 - 144.50	Beacons-primary (Note 3)
144.50 - 144.60	Beacons-secondary (Note 3)
144.800 - 144.900	Data Transmission
144.925 - 144.975	CW Beacons
145.700 - 146.000	Satellite Segment
146.450	Primary voice
146.500	National calling (primary)
146.600	RTTY
147.300	ATV Liaison
147.325	RTTY
147.350	RTTY
147.400	ATV Liaison
147.425	ATV Liaison
147.450	ATV/SSTV/FAX
147.475	SSTV/FAX Liaison
147.500	National calling (secondary)
147.550	Micro nets
147.575	Data nets
147.600	Data packet

**Notes:**  
1) FM channels spacing is 25 kHz and repeater offset is 600 kHz.

**Note 2:**  
2) FM channel numbers designated by last four digits of (repeater output) frequency.

3) The beacon frequencies are allocated in accordance with the beacon plan on a state basis.

### 4 The UHF Bands

The 420 MHz Band (70 centimetres)



420.0 - 450.0 MHz	ATV channel, 1 DSB/VSB
420.00 - 432.00	Vision
426.25	Sound
431.75	Repeater linking - A pairs (Note 4)
420.05 - 421.00	DX EME
432.00 - 432.01	DX CW
432.01 - 432.025	Calling frequency
432.025 - 432.050	DX MS
432.050	Calling frequency
432.050 - 432.075	DX RTTY
432.075	Calling frequency
432.075 - 432.100	DX Phone
432.100	Calling frequency (primary)
432.100 - 432.200	Phone
432.200	Calling frequency (secondary)
432.200 - 432.300	SSTV
432.300	Calling frequency
432.300 - 432.400	CW/Phone
432.400 - 432.600	Beacons (Note 5)
432.600 - 433.000	General all modes
433.025 - 434.975	FM repeater inputs & simplex
433.025 - 433.725	FM repeater inputs
433.750 - 434.250	Simplex

434.275 - 434.975	FM repeater inputs
435.000 - 438.000	Satellites
438.025 - 439.975	FM repeater outputs & simplex
438.025 - 438.725	FM repeater
438.025	Mobile voice (secondary)
438.075	Mobile voice (secondary)
438.125	RTTY
438.175	Mobile voice
438.225	Mobile voice (secondary)
438.275	WICEN portable
438.325	Mobile voice
438.375	Mobile voice (secondary)
438.425	Mobile voice
438.475	Mobile voice
438.525	Mobile voice (national primary)
438.575	Data
438.625	WICEN portable
438.675	Mobile voice (secondary)
438.725	RTTY
438.750 - 439.250	FM simplex
438.775	RTTY
438.800	WICEN
438.825	Voice (secondary)
438.875	Data
438.925	SSTV
439.000	Voice (national primary)
439.050 - 439.075	Data packet
439.125	Voice secondary
439.275 - 439.975	FM repeater outputs
439.275	Mobile voice
439.325	RTTY
439.425	Mobile voice
439.475	RTTY
439.575	Mobile voice
439.725	Mobile voice
439.875	Mobile voice
439.975	SSTV
440.050 - 441.000	Repeater linking - B pairs (Note 4)
440.000 - 443.000	Experimental - all modes
443.000 - 450.000	ATV channel 2 VSB
444.25	Vision carrier
449.75	Sound carrier

**Notes:**  
1) FM channel spacing is 25 kHz and repeater offset is 4 MHz.

2) FM channel numbers designated by last four digits of (repeater output) frequency.

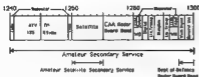
3) FM channels with no specific recommended use may be used for any purpose.

4) A pair of frequencies are to be used for repeater linking. Maximum power for inter repeater linking is 5 watts.

5) The beacon frequencies are allocated in accordance with the beacon plan on a state basis.

4.2 The 576 MHz Band 50 centimetres	576.0 - 585.0 MHz
Only existing ATV repeaters will be permitted in this band	578.00 - 585.00 ATV, VSB or repeater output
	579.25 Vision carrier
	584.75 Sound carrier

#### 4.3 The 1240 MHz Band (23 centimetres) 1240.0 - 1300.0 MHz



Frequency (MHz)	Details
1240.00 - 1241.00	FM Relays and Links (Note 3)
1241.00 - 1259.00	ATV Channel
1259.00 - 1260.00	FM Relays and Links (Note 3)
1260.00 - 1270.00	Satellite Communication (WARC 1979)
1270.00 - 1280.00	General use except in areas where these frequencies are in use for Radio Location (Note 4)
1280.00 - 1281.00	FM Relays and Links (Note 3)
1281.05 - 1283.00	FM Repeater outputs
1281.05	RTTY
1281.10	Mobile voice
1281.15	RTTY
1281.20	Mobile voice
1281.25	Data
1281.30	Mobile voice
1281.35	Data
1281.40	Mobile voice (secondary)
1281.45	Mobile voice (primary)
1281.50	Mobile voice (secondary)
1281.60	Mobile voice
1281.65	Mobile voice
1281.70	Mobile voice
1281.80	Mobile voice
1281.85	Mobile voice
1281.90	ATV Liaison
1281.95	Mobile voice
1282.00	ATV Liaison
1282.10	Mobile voice
1282.15	Mobile voice
1282.20	RTTY
1282.25	Mobile voice
1282.30	RTTY
1282.35	Mobile voice
1282.40	Data
1282.45	Mobile voice
1282.50	Data
1282.60	Mobile voice
1282.70	Mobile voice
1282.80	Mobile voice
1282.90	Mobile voice
1283.00	Mobile voice
1283.10	Digital and Packet Radio
1283.20 - 1285.00	In-band Linear Transponder
1285.00 - 1287.00	General use
1287.00 - 1290.00	FM Simplex
1290.00 - 1292.00	National FM Simplex Calling Frequency
1292.00 - 1294.00	In-Band and Cross Band Linear Transponder

1292.00 - 1293.00  
1293.00 - 1295.00  
1295.00 - 1297.00

1296.40 - 1296.59  
1297.00 - 1300.00

#### Notes:

- 1) FM channel spacing is 25 KHz and repeater offset is 12 MHz.
- 2) FM channels with no specific recommended use may be used for any purpose.
- 3) A pair of frequencies are to be used for repeater linking. Maximum power for inter-repeater linking is 5 watts.
- 4) In Australia, some Department of Aviation RADAR's are centered on 1275.0 MHz and 1305.0 MHz, while some Department of Defence RADAR's are centered on 1300.0 MHz. Accordingly the frequencies 1270.0 to 1280.0 MHz and 1295.0 to 1300.0 MHz are allocated as a guard band to ensure no harmful interference is caused to the primary user.
- 5) The beacon frequencies are allocated in accordance with the beacon plan on a state basis.

#### 4.4 The 2300 MHz Band (13 centimetres) 2300.0 - 2450.0 MHz

Frequency (MHz)	Details
2300.00 - 2301.00	General use
2301.00 - 2302.00	CW
2302.00 - 2303.00	EME (moon-bounce)
2303.00 - 2304.00	EME (moon-bounce)
2304.00 - 2305.00	CW & SSB
2305.00 - 2306.00	Beacons
2306.00 - 2307.00	General use
2307.00 - 2308.00	Simplex & repeaters
2308.00 - 2309.00	FM All modes
2309.00 - 2310.00	ATV
2310.00 - 2311.00	Digital comms
2311.00 - 2312.00	Repeaters
2312.00 - 2313.00	ATV
2313.00 - 2314.00	EME (moon-bounce)
2314.00 - 2315.00	All modes

2300.000 - 2320.100 MHz	General use
2320.100 - 2320.150	CW
2320.150 - 2320.800	EME (moon-bounce)
2320.800 - 2320.990	CW & SSB
2320.990 - 2321.000	Beacons
2321.000 - 2322.000	General use
2322.000 - 2323.000	Simplex & repeaters
2323.000 - 2324.000	FM All modes
2324.000 - 2325.000	ATV
2325.000 - 2326.000	Digital comms
2326.000 - 2327.000	Repeaters
2327.000 - 2328.000	ATV
2328.000 - 2329.000	EME (moon-bounce)
2329.000 - 2400.000	All modes

FM Relays and Links (Note 3)  
FM Repeater inputs  
Weak signal modes, except in areas where these frequencies are in use for Radio Location (Note 4)  
Beacons (Note 5)  
General use except in areas where these frequencies are in use for Radio Location (Note 4)

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## 14 MHz Beacons

This series is sponsored by the Northern Californian DX Foundation. The beacons all operate in turn on the one frequency of 14 100 MHz. The series starts on the hour. They send the following series of signals at the powers indicated.

QST de (callsign) 100W

- 100W

- 10W

- 1W

- 0.1W

sk de (call) 100W

The call sequence is as follows.

T+0 min	4UIUN/B	New York
T+1	W6WX/B	Stanford
T+2	KH60/B	Honolulu
T+3	JA21GY	Ise City
T+4	4X6YU/B	Tel Aviv
T+5	OH2B	Espoo
T+6	CT8B	Funchal
T+7	ZS6DN/B	Pretoria
T+8	LU4AA	Santa Cruz
T+9	HK4LR/B	Colombia

## VK Aeronautical Beacons useful for Propagation Tests

VK1	Canberra	NDB	263	kHz	CB
		VOR	116.7	MHz	
VK2	Sydney	NDB	317	kHz	SY
		VOR	115.4	MHz	
	Lord H. Is	NDB	272	kHz	LHI
VK3	Melb	NDB	356	kHz	EN
		VOR	114.1	MHz	
VK4	Brisbane	NDB	302	kHz	BN
		VOR	113.2	MHz	
	Cairns	NDB	364	kHz	
VK5	Adelaide	NDB	362	kHz	AD
		VOR	116.4	MHz	
VK6	Perth	NDB	400	kHz	PH
		VOR	113.7	MHz	
	Pt Hedland	NDB	260	kHz	PD
		VOR	114.1	MHz	
VK7	St Helens	NDB	392	kHz	STH
	Strahan	NDB	257	kHz	SRN
	Hobart	VOR	112.7	MHz	HB
VK8	Alice Spg	NDB	335	kHz	AS
		VOR	115.9	MHz	
	Darwin	NDB	344	kHz	DN
		VOR	112.4	MHz	
VK9	Cocos Is	NDB	305	kHz	CC
	Norfolk Is	NDB	260	kHz	NF
	Christmas Is.	NDB	341	kHz	XXM

## ZL Aeronautical Radio beacons

Station	Call-Sign	Freq. kHz
Ashburton	AS	254
Chatham Is.*	CI	322
Christchurch	CH	274
Dunedin	DN	338
Gisborne	GS	346
Hokitika	HK	310
Kaikoua	KI	326
Kaitiaki	KT	238
Napier	NR	354
Nelson	NS	394
New Plymouth	NP	370
Oamaru	OU	302
Tauranga	TC	368
Waikato	WO	246
Wairakei	WI	254
Wanganui	WU	302
Waverley	WY	330
Wellington	WN	298
Westport	OT	398
Westport	WS	278
Whakatane	WK	362
Whangarei	WR	386
Whenuapai	WP	306
Wigram	WG	406
Woodend	OD	282

\*No 24-hour service. Operated only on request through Chatham Island Radio ZLC.

## Emergency

First aid in case of shock Ref P.120 (last page) 1990 Call book.

All emergency services, all states, Dual 000.

Federal Sea Safety and Surveillance Centre (062) 47 6666/47 5244

Natural Disasters Organisation (062) 46 6600

(charges can be reversed)

## Standard Frequency Transmissions

Station	Frequencies (MHz)	Location
WWV	2.5, 5.10, 15.20	Colorado, USA.
WWVH	2.5, 5.10, 15.	Hawaii, USA.
VNO	5.10, 15.	Liandri, NSW
Omega	13.7MHz	Darwin, Vic
NFN	21.76, 17.53, 13.38, 8.15, 4.955.	Guam
NFM	22.593, 16.457, 13.655, 9.05, 131.05 kHz	Hawaii, USA.
ZLW/ZMO	417.5 kHz	Wellington, NZ.

## Wireless Institute Civil Emergency Network (WICEN)

Primary	Secondary Frequencies
3.600 MHz	(+25 kHz SSB
7.075	-25 kHz CW)
14.125	
21.190	
28.450	

## Wicen Nets

VK1	None		
VK2	THU	1100Z	7150 repeater
VK3	SUN	1030Z	3 600 MHz
VK4	SUN	2230Z	7.075 MHz
(as required Brisbane Stormwatch 7000 repeater)			
VK5	WED	1000Z	(+30 summer-time) 7000 Repeater
		1000Z	(+1h summer-time) 3 600 MHz
VK6	WED	1200z	3 600 Mhz
VK7	None		
VK8	Refer VK5.		

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809	\$40	VT225	\$10
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# 10 METRE BEACONS

Freq.	Call	Operation	Location	Notes
28.050	PY2GOB		Sao Paulo, Brazil	15W, vertical
28.175	VE3TEN	C	Ottawa, Ontario, Canada	10W, ground plane
28.195	1Y4M		Bologna, Italy	20W/5/8 ground plane
28.200	GB3SX	C	Crowborough, UK	8W, dipole
28.200	KP4MS	C	St Petersburg, Florida, USA	75W, ground plane
28.201	LU8ED		Buenos Aires, Argentina	5W
28.2025	ZS5VHF		Durban, Rep of South Africa	15W, ground plane
28.205	DL1GH	C	Mt Predigtstuhl, West Germany	100W, vertical dipole
28.207	W8FKL	C	Venice, Florida, USA	10W, vertical
28.208	WA110B	C	Marlborough, Massachusetts, US	75W, vertical
28.210	3B8MS	C	Mauritius	ground plane
28.210	K4KMZ	I	Elizabethtown, Kentucky, USA	20W, vertical
28.212	EA6RCM		Palma de Mallorca, Spain	4W, 5el NNE
28.215	ZD9GI	C	Cough Is South Atlantic	ground plane
28.215	GB3RAL	C	Slough, Berkshire, UK	20W, ground plane
28.215	LU4XI		Puerto Deseado, Argentina	
28.220	5B4CY	C	Zygi, Cyprus	25W, ground plane
28.222	W9UKO	C	Lake Bluff, Illinois, USA	10W, ground plane
28.2225	HG2BHA	C	Tapolea, Hungary	10W, ground plane
28.2275	EA6AU	C	Mallorca, Balearic Is, Spain	10W 5/8 ground plane
28.230	ZL2MHF	C	Mt Clime, New Zealand	1W, vertical dipole
28.231	N4LMZ	C	Mobile, Alabama, USA	2W, 5/8 ground plane
28.232	W7JPI/AZ	C	Sonoita, Arizona, USA	5W, 3el Yagi NE
28.233	KD4EC	C	Jupiter, Florida, USA	7W, ground plane
28.235	VP9BA	C	Hamilton, Bermuda	10W, ground plane
28.2375	LA5TEN	C	Oslo, Norway	10W, 5/8 ground plane
28.240	OA4CK	C	Lima, Peru	10W
28.2405	5Z4ERR	C	Kiambu, Kenya	
28.2425	ZS1CTB	C	Capetown, Rep of South Africa	20W, 1/4 vertical
28.245	A92C		Bahrain	dipole, NW/SE
28.247	EA3JA		Barcelona, Spain	
28.2475	EA2HB	I	San Sebastian, Spain	6W, ground plane
28.248	K1BZ	C	Belfast, Maine, USA	5W, vertical dipole
28.250	Z21ANB	C	Bulawayo, Zimbabwe	15W, ground plane
28.250	4N3ZHK		Yugoslavia	1W, vertical
28.252	WB4JHS	I	Durham, North Carolina, USA	7W, vertical
28.254	KB2EAR	I	Kendall Park, New Jersey, USA	
28.255	LU1UG		Gral Pico, Argentina	5W, ground plane
28.2575	DKOTEN	C	Konstanz, West Germany	40W, ground plane
28.260	VK5WI	C	Adelaide, SA, Australia	10W, ground plane
28.262	VK2RSY	C	Sydney, NSW, Australia	25W, ground plane
28.264	VK6RTW	C	Perth, WA, Australia	
28.266	VK6RTW	C	Albany, WA, Australia	
28.266	KB4UPI	C	Birmingham, Alabama, USA	50W, 1/4 vertical
28.2685	W9KFO	I	Eaton, Indiana, USA	0.75W, vertical
28.270	ZS6PW	C	Pretoria, Rep of South Africa	10W, 3el Yagi on G-land
28.270	VK4RTL	C	Townsville, QLD, Australia	
28.2725	9L1PTN	I	Freetown, Sierra Leone	10W, vertical dipole
28.275	AL7GQ	C	Jackson, Mississippi, USA	0.5/1W, broadside loop
28.2755	N6RDX	I	Stockton, California, USA	20W, 3el Yagi
28.278	DF0AAB	C	Kiel, West Germany	15W, ground plane
28.280	YV5AYV		Caracas, Venezuela	10W, rotary beam on Europe
28.280	LU8EB		Buenos Aires, Argentina	5W
28.282	VE1MUF	C	Fredrickton, NB, Canada	0.5W, dipole
28.284	VP8ADE	C	Adelaide Is, Antarctica	8W vertical beam to G-land
28.286	KA1YE		Rochester, New York, USA	2W, vertical dipole
28.287	W8OMV		Asheville, North Carolina, USA	5W, ground plane
28.287	H44SI		Honiara, Solomon Is	15W, ground plane
28.288	W2NZH	I	Moorestown, New Jersey, USA	5W, ground plane
28.290	V56TEN	C	Mt Matilda, Hong Kong	10W, vertical
28.292	ZD8HF		Ascension Island	
28.2925	LU2FFV		San Jorge, Argentina	5W, ground plane
28.295	WB8UPN	I	Cincinnati, Ohio, USA	10W, vertical
128.296	W3VD	C	Laurel, Maryland, USA	1.5W, vertical dipole
28.297	WA4DJS	I	Ft Lauderdale, Florida, USA	10W, 76 meter longwire
28.300	PY2AMI	C	Sao Paulo, Brazil	10W, vertical dipole
28.301	ZS1LA	C	Stilbay, Rep of South Africa	20W, 3el Yagi NW
28.315	ZS6DN	C	Irene, Rep of South Africa	100W, vertical
28.888	W6IRT		North Hollywood, California, USA	5W, ground plane, code practice
28.992	DLOANN		Nuernberg, West Germany	1W, delta loop

# 6 METRE BEACONS

Frequency	Call sign	Location	LOC	ERPW	Mode	Source	Date
50 000	G3BUX	Sheffield	-	-	-	Rad Com	12/88
50 004	PY1RO	Rio De Janeiro	-	-	-	AR	12/88
50 005	H44HIR	Honiara	Q190	10	-	AR	12/88
50 005	ZS2SIX	Port Elizabeth	KF25	10	A1A	AR	2/89
50 011	JA21GY	Mie	PM84	-	-	AR	2/89
50 015	PJ4B	-	FK52TF	-	-	ZL2KT	21/3/89
50 015	SZ2DH	Athens	KM18	-	-	AR	2/89
50 017	JE6ZIH	Miyazaki	PM51RU	-	-	ZL3AAU	2/4/89
50 020	GB3SIX	Anglesey	IO73TJ	100	F1A	AR	12/88
50 020	JA6ZIH	Japan	PM51	-	-	AR	2/89
50 024	ZS61W	Pretoria	-	-	-	Rad Com	10/88*
50 025	6Y5RC	Kingston	FK17	40	F1A	AR	12/88
50 028	JA7ZMA	Fukushima City	QM07	-	-	AR	2/89
50 030	CT0WW	Portugal	IN61	-	-	AR	2/89
50 033	ZD8VHF	Ascension Is	II2ZTB	50	-	-	1/89
50 035	H1JX	-	-	-	-	AR	12/88
50 035	ZB2VHF	Gibraltar	IM76HE	100	A1A	AR/R Com	12/88
50 038	FY7THF	French Guina	GJ35	-	-	AR	2/89
50 0425	GB3MCB	St Austell	IO70	-	-	Rad Com	11/88
50 045	OX3VHF	Greenland	GP60QQ	20	A1A	AR	12/88
50 048	VE6ARC	-	-	-	-	AR	12/88
50 050	GB3NHQ	Potters Bar	1091VQ	15	F1A	AR	12/88
50 0575	TF3SIX	Iceland	HP94	-	-	-	2/89
50 060	W1XJ/B	-	-	-	-	ZL3AAU	25/3/89
50 060	ZS6DN/B	Pretoria	KG44	100	-	AR	2/89
50 062	PY2AA	Sao Paulo	GG66	25	A1A	AR	2/89
50 0625	GB3NGI	-	-	-	-	Rad Com	11/88*
50 064	WD7Z	Arizona	EL69	-	-	AR	2/89
50 065	GJ4HXJ	England	IN89	-	-	AR	2/89
50 065	NB301	Rhode Is	FN41	-	-	AR	2/89
50 065	WD7X/B	New Mexico	DM75	-	-	ZL3AAU	12/3/89
50 066	VK6RPH	Perth	OF78	-	-	AR	12/88
50 067	WA6IJZ	-	-	-	-	AR	12/88
50 068	K6FVXB	-	CM88	-	-	ZL3AAU	2/3/89
50 074	ZS4SA	Deneysville	-	-	-	Rad Com	10/88*
50 075	VS6SIX	Hong Kong	OL72	30	-	AR	1/89
50 075	ZS5SIX	-	-	-	-	Rad Com	11/88*
50 078	T12NA	Costa Rica	EK70	-	-	AR	2/89
50 080	HC8SIX	Galapagos Is	E169	-	-	AR	2/89
50 080	KH6JJK	Hawaii	BL11	-	-	AR	2/89
50 085	9H1SIX	Malta	JM75FV	-	-	RC 6/87 AR	12/88
50 086	VP2MO	Montserrat	FK8	-	-	AR	2/89
50 088	VE1SIX	New Brunswick	FN85	-	-	AR	2/89
50 089	WA6JRA	-	-	-	-	AR	12/88
50 090	KJ6BZ	Johnston Is	AK56	-	-	AR	2/89
50 090	ZF2KZ	Cayman Is	EK99	-	-	AR	12/88
50 092	W5GTP	Louisiana	EM40	-	-	AR	2/89
50 099	KP4EKG	Puerto Rico	FK68	-	-	AR	2/89
50 099	VP5D	-	FL**	-	-	ZL3AAU	7/4/89
50 100	HC2FG	Ecuador	F107	-	-	AR	2/89
50 100	KG6DX	Guam	QK23KL	-	-	AR	12/88
50 100	ZS3E	-	JG87	-	-	ZL2BGJ	26/2/89
50 110	A61XL	U Arab Emir	LL74	-	-	AR	2/89
50 110	BY4AA	China	-	-	-	AR	12/88
50 120	487EA	Sri Lanka	MJ97	-	-	AR	2/89
50 321	ZS5SIX	South Africa	KG50	-	-	AR	2/89
50 490	JG12GW	Tokyo	PM95	-	-	AR	12/88
50 499	5B4CY	Zyzy	KM54PS	-	-	AR	2/89
50 500	FK8KAB	-	-	-	-	AR	12/88
50 904	ZS1SIX	-	-	-	-	Rad Com	11/88
*****							
51 020	ZL1UHF	Nihotupu	-	25	F1	AR	2/89*
51 030	ZL2MHB	Napier	RF80	10	F2	AR	2/89*
51 225	ZL2VHT	Inglewood	RF70	30	F2	NZART Call Bk	88+
*****							
52 013	P29BPL	Port Moresby	-	-	-	AR	12/88
52 100	ZK2SIX	Niue	AH50	-	-	AR	12/88
52 150	VK0CK	Macquarie Is	-	-	-	-	-
52 200	VK8VF	Darwin	PH67	15	-	AR	12/88
52 250	ZL2VHM	Pahiatua Track	RE79	8	F1	NZART Call Bk	88+
52 310	ZL3MHF	Aylesbury	RE66	-	-	NZART Call Bk	88
52 320	VK6RTT	Wickham	OG89	-	-	AR	2/89
52 325	VK2RHV	Newcastle	QF67	-	-	AR	2/89
52 330	VK3RGG	Geelong	QF21	-	-	AR	2/89
52 345	VK4ABP	Longresch	QG26	-	-	AR	2/8

952350	VK6RTU	Kalgoorlie, WA				
52 370	VK7RST	Hobart	QE37	-	AR	12/88
52 410	VK1RCC	Mt Majura				
52 418	VKOMA	Mawson				
52 420	VR2RSY	Sydney	QP56	-	AR	12/88
52 425	VK2RGE	Gunnedah	QP59	-	AR	12/88
52 435	VK3RMV	Hamilton	QP12	-	AR	2/89
52 440	VK4RTL	Townsville	QH30	-	AR	2/89
52 445	VK4RIK	Cairns	QH23	-	AR	2/89
52 450	VK5VF	Mount Lofly	PF95	-	AR	2/89
52 460	VK6RPH	Perth	OF78	-	AR	2/89
52 465	VK6RTW	Albany	OF84	-	AR	2/89
52 470	VK7RNT	Launceston	QE38	-	AR	2/89
52 485	VK8RAS	Alice Springs	PG66	-	AR	2/89
52 490	ZL2SIX	Blenheim	RE68	10	P1	88+
52 510	ZL2MHF	Mt Chimie	RE78BU	4	E1	88

\*Not Operational +Status Unknown Source: call signs indicate beacons heard in ZL

## DUPLEX REPEATER LIST FEBRUARY 1990

OUT PUT TXFREQ	INPUT RXFREQ	SITE	COVERAGE	OUT PUT TXFREQ	INPUT RXFREQ	SITE	COVERAGE	
146.9000	146.3000	Black Hill	VK1RAC	438.2250	433.2250	Port Kembla	VK2RUW	Wollongong
146.9500	146.3500	Mt Ginini	VK1RGI	438.2750	433.2750	Chatawood	VK2RWS	Sydney
438.3760	433.3750	Isaacs Ridge North	VK1RIR	438.3250	433.3250	Mt Marae	VK2REE	Taree
438.5250	433.5250	Mt Ginini	VK1RGI	438.3250	433.3250	Grenfell	VK2RWM	Grenfell
29.6200	29.5200		VK2RAH	438.3750	433.3750	Kurrangong Heights	VK2RUT	Kurrangong
53.625	52.625	Sugarloaf Range	VK2RSN	438.4250	433.4250	Hurstville	VK2RUH	Sydney
53.8500	52.8500	Dural	VK2RWI	438.4750	433.4750	Chatawood	VK2RRS	Sydney
146.6250	146.0250	Byron Bay	VK2RBB	438.5250	433.5250	Middle Brother	VK2RPM	Pt Macquarie
146.6250	146.0250	Razorback	VK2RLD	438.5250	433.5250	Dural	VK2RWI	Sydney
146.6500	146.0500	Mt Coramba	VK2RCH	438.6250	433.6250	Merewether	VK2RUM	Newcastle
146.6500	146.0500	Mt Bindo	VK2RDX	438.6750	433.6750	Mt Sugarloaf	VK2RAN	Newcastle
146.6500	146.0500	Terry Hie Hae	VK2RMI	438.6750	433.6750	Nightcap Range	VK2RSC	Lismore/Casino
146.6750	146.0750	Blacktown (RTTY)	VK2RTY	438.6750	433.6750	Williams Hill	VK2RTW	Wagga Wagga
146.7000	146.1000	Mt Canchois	VK2RAO	438.7250	433.7250	Sublime Point	VK2RIL	Woolongong
146.7000	146.1000	Milten	VK2RMU	1281.7500	1293.7500	Dural	VK2RWI	Sydney
146.7000	146.1000	Middle Brother	VK2RPM	29.4400	29.5400		VK3RHF	Melbourne
146.7250	146.1250	Somersby	VK2RAG	52.5500	52.5500	Wattle Glen	VK3RMH	Melbourne
146.7500	146.1500	Mumbulla Mt.	VK2RFS	53.5750	52.5750	Dandenong	VK3RDT	Melbourne
146.7500	146.1500	Mt Gibraltar	VK2RHR	53.6750	52.6750	Lake Mountain	VK3RTN	Melbourne
146.7500	146.1500	Mt Cranney	VK2RTM	53.9750	52.9750	Mt Buller	VK3RGM	Mt Buller
146.7500	146.1500	Mt Flackney	VK2RWG	146.0500	146.0500	Donalds Knob	VK3REG	East Gippsland
146.7750	146.1750	Sugarloaf Range	VK2RTZ	146.0500	146.0500	Mt Wombat	VK3RGV	Shepparton
146.8000	146.2000	Neddie Mtn	VK2RCC	146.7000	146.1000	Mt Mitta Mitta	VK3RNC	Corryong
146.8000	146.2000	Goonellabah	VK2RIC	146.7000	146.1000	Ouyen	VK3RON	Ouyen
146.8000	146.2000	Heathcote	VK2RLE	146.7500	146.1500	Mt Bunninyong	VK3RBA	Ba. larat
146.8000	146.2000	Kendell Trig	VK2RTD	146.8000	146.2000	Mt Tassie	VK3RLV	Laloraine Valley
146.8250	146.2250	Bundock Mountain	VK2RET	146.9000	146.3000	Mildura	VK3RMA	Mildura
146.8500	146.2500	Mt Kaputar	VK2RAB	146.8500	146.2500	Kunglake	VK3RBN	
146.8500	146.2500	Mt Murray	VK2RAW	146.9000	146.3000	Smeston Hill	VK3RBN	Ballarat
146.8500	146.2500	Mt Binger	VK2RGF	146.9000	146.3000	Mt Nowa Nowa	VK3REB	Barnardale
146.8750	146.2750	Terry Hills	VK2RMB	146.9000	146.3000	Swan Hill	VK3RSH	Swan Hill
146.9000	146.3000	Mt Sugarloaf	VK2RAN	146.9500	146.3500	Mt William	VK3RWZ	The Grampian
146.9000	146.3000	Booma Mount	VK2RRT	147.0000	146.4000	Mt Anakie	VK3RGL	Gee ong
146.9250	146.3250	North Ryde	VK2RGR	147.0000	146.4000	Mt Big Ben	VK3RNE	Wodonga
146.9500	146.3500	Glen Innes	VK2RNE	147.0250	147.6250	Mt Fatigue	VK3RGS	Toora
146.9750	146.3750	Mt Sugarloaf (RTTY)	VK2RAN	147.0500	147.6500	Mt Livingstone	VK3RGO	Oraesia
147.0000	146.4000	Dural	VK2RWI	147.0500	147.6500	Robnauale	VK3RVL	Robnauale
147.0250	147.6250	Paddington	VK2ROT	147.0500	147.6500	Mt Warrnambool	VK3RWL	Warrnambool
147.0500	147.6500	Mount Druitt	VK2RBM	147.0750	147.6750	Heathmont	VK3RCR	Melbourne
147.1000	147.7000	Grenfell	VK2RWM	147.1000	147.7000	Mt Porepunkah	VK3RPB	Bright
147.1000	147.7000	Mt Arthur	VK2RZL	147.1000	147.7000	Bass Hill	VK3RSQ	Stn Gipsland
147.1500	147.7500	Chatawood	VK2RWS	147.1250	147.7250	Geelong	VK3RGC	Gee ong
147.2000	147.8000	Mt Cambewarra	VK2RSD	147.1500	147.7500	Mt Alexander	VK3RCV	Bendigo
147.2250	147.8250	Lane Cove	VK2RST	147.1750	147.7750	Olinda	VK3REC	Melbourne
147.2500	147.8500	Asquith	VK2RNS	147.2250	147.8250	Mt Baw Baw	VK3RWG	West Gippsland
147.2750	147.8750	Sublime Point (RV)	VK2RIL	147.2500	147.8500	Mt Macedon	VK3RMM	Melbourne
147.3000	147.9000	Springwood	VK2RIS	147.2750	147.8750	Mt Cawley	VK3ROW	Colac
147.3750	147.9750	Cabbage Tree Mtn	VK2RGL	147.3000	147.9000	Victoria Wide	VK3RWP	Wacen Portable
147.9250	147.3250	Mt Gray	VK2RGN	147.3500	147.9500	Olinda	VK3RTY	RTTY Melbourne
438.0750	433.0750	Somersby	VK2RAG	434.2750	439.2750	Mt Macedon	VK3RMM	Wacen Melb
438.1750	433.1750	Terry Hills	VK2RMB	433.0750	433.0750	Mt St Leonard	VK3RUM	Melbourne
438.1750	433.1750	Doughboy Mountain	VK2RNT	438.1750	433.1750	Devils River	VK3RUG	Alexandra

438.2250	433.2250	Olinda
438.2750	433.2750	Victoria Wide
438.3750	433.3750	Carraoang
438.4750	433.4750	Mt Hollowback
438.4750	433.4750	Bendigo
438.5250	433.5250	Mitcham
438.5250	433.5250	Mt Stanley
438.5250	433.5250	Merbein
438.5250	433.5250	Victoria Wide
438.6750	433.6750	Mt William
439.3750	434.3750	Glen Waverley
439.4250	434.4250	Chesney Vale
439.4750	434.4750	Mt Anakie
439.7250	434.7250	Arthura Seat
53.7250	52.7250	Calliope Range
53.7250	53.1250	Mount Haren
146.5250	146.0250	Gladstone
146.5500	146.0500	Roma
146.6750	146.0750	Mt Kiangarow
146.8750	146.0750	Longlands Gap
146.9000	146.1000	Mt Archer
146.7000	146.1000	Mt Stuart
146.7000	146.1000	Springbrook
146.7000	146.1000	Mount Isa
146.7250	146.1250	Mt Gordon
146.7500	146.1500	Mt Lofly
146.7750	146.1750	Proserpine
146.8000	146.2000	Mt Goonanemas
146.8000	146.2000	Thursday Island
146.8500	146.3500	Weipa
146.8500	146.2500	Buderim
146.8750	146.2750	Chinchilla
146.9000	146.3000	Mt Stradbroke
146.9000	146.3000	Calliope Range
146.9250	146.3250	Mount Ne
146.9500	146.3500	Mt Bellenden K
146.9750	146.3750	Blue Mtn Nebe
147.0000	146.4000	Mt Glorious
147.0000	146.4000	Black Mtn
147.0000	146.7000	Spider Mtn
147.1500	147.7500	Spring Hill
147.1500	147.7500	Kedron
147.3000	147.9000	Mt Glorious
147.3500	147.9500	Mt Inkerman
147.8500	147.0500	Mt Cotten
147.8750	147.0750	Mt Cotton
147.8250	147.2250	Manly West
147.8500	147.2500	Mt Devilin
438.0250	433.0250	Mt Tamborine
438.0750	433.0750	Buderim
438.2250	433.2250	Mt Stuart
438.2250	433.2250	Springbrook
438.3750	433.3750	Ipswich
438.4250	433.4250	Proserpine
438.4750	433.4750	Maleny
438.5000	433.5000	Hodgson Range
438.5250	433.5250	Mt Cool-Tha
438.5250	433.5250	Spring Hill
438.5250	433.5250	Kedron
438.6750	433.6750	Mt Goonanemas
439.7000	439.7000	Mt Mowbullian
438.8250	433.8250	Mt Boulder
439.5000	439.5000	Redbank Plains
439.2750	434.2750	Toowoomba
439.3500	434.3500	Mount Haren
146.5500	146.0500	Narracorte
146.6750	146.0750	O'Halloran Hill
146.7500	146.1000	The Bluff
146.8000	146.2000	Coolame
146.8250	146.2250	Angatston
146.8500	146.2500	Houghton
146.9000	146.3000	Mount Gambier

Melbourne  
 WICEN Portable  
 Gapsall  
 Ballarat  
 Bendigo  
 Melbourne  
 Wangaratta  
 Mildura  
 WICEN Portable  
 The Grampians  
 Melbourne  
 Benalla  
 Geelong  
 Melbourne  
 Gladstone  
 Cairns & Dist  
 Gladstone  
 Roma  
 Atherton  
 Rockhampton  
 Townsville  
 Gold Coast  
 Mount Isa  
 Bowen  
 Toowoomba  
 Bundaberg  
 Cape York  
 Sunshine Coast  
 Chinchilla  
 Ipswich  
 Gladstone  
 Redcliff  
 Cairns  
 Sarnia  
 Brisbane  
 Mackay  
 Gympie  
 Brisbane  
 WICEN Portable  
 Brisbane & Dist  
 Burdekin  
 Brisbane  
 Brisbane  
 Brisbane  
 Brisbane & Dist  
 Sunshine Coast  
 Townsville  
 Gold Coast  
 Ipswich  
 Mackay  
 Clermont  
 Brisbane  
 Brisbane  
 WICEN Portable  
 Bundaberg  
 Darling Downs  
 Gympie  
 Brisbane  
 Toowoomba  
 Cairns & Dist  
 Narrocoorte  
 Pt Pirie & Dist  
 Cowell  
 Barossa Valley  
 Adelaide  
 Mt Gambier

# Simplex Repeater List

OUT PUT	INPUT	SITE	COVERAGE	Freq	Site	Coverage
TXFREQ	RXRFREQ					
147 0000	146 4000	Crafrers	VK5RAD Adelaide	144.8000	Mt Gnum	VK1RGI SE NSW
438.3250	433 3250	Mount Gambier	VK5ROH	144.8000	Terrey Hills	VK2RMB Sydney
438.4250	433 4250	Angaston	VK5RBV Barossa Valley	144.8500	Dural	VK2RW1 Sydney & Dist
438.5250	433 5250	Crafrers	VK5RVP Adelaide	144.9000	Hornsby	VK2RPH Sydney
1381.2500	1261 2500		VK5RWH Adelaide	145.0500	Mt Nardi	VK2RPL Lismore
29 6300	29 6300		VK5RHF Perth	147.5750	Mt Kaputar	VK2RAB Gunnedah
53 8000	52 0000	Tie Hill	VK6RTH Perth	147.5750	Mt Canobolas	VK2RAO Orange
146.6500	146.050	Bunbury	VK6RSW Bunbury	147.5750	Mt Murray	VK2RAW Wollongong
146.6750	146.0750	Whm Creek	VK6RCA Carnarvon	147.5750	Mt Coramba	VK2RCH Coffin Harbour
146.7000	146 1000	Roleystone	VK6RAP Perth	147.5750	Mt Bindo	VK2RDX East NSW
146.7250	146 1250	Albany	VK6RAL Albany	147 5750	Mt Bingar	VK2RCF Griffith
146.7500	146 1500	Experance	VK6RES Esperance	147 5750	Pt Lookout	VK2RLO Lismore
146.7500	146 1500	Koolan Island	VK6RKI Koolan Island	147 5750	Middle Brother	VK2RPM Port Macquarie
146.7500	146 1500	Lesmurdie	VK6RLM Perth	147 5750	High Range	VK2RPS South Highlands
146.8000	146.2000	Tie Hill	VK6RTH Perth	147 5750	Mt Tumorrara	VK2RPT Tumut
146.8000	146.2000	Karratha	VK6RWP Karratha	147.5750	Grundys Mountain	VK2RPW Tamworth
146.8250	146.2250	Mt Barker	VK6RAA Albany	147.5750	Mt Cambewarra	VK2RSD Nowra
146.8500	146.2500	Northwest Cape	VK6REX Exmouth	147.6000	Mt Crawney	VK2RTM Gosford
146.8500	146.2500	Kambalda	VK6RKB Kalgoorlie	438.8750	Mt Nardi	VK2RPL Lismore
146.8750	146.2750	O'Connor	VK6RSR Perth	144 4350	Mt Bainbridge	VK3RMV Melbourne
146.9000	146.3000	Mt William	VK6RWM Bunbury	144.8000	Red Hill	VK3RPK Melbourne
146.9500	146.3500		VK6RPD Perth	144.8000	Sunbury	VK3RPS Melbourne
146.9500	146.3500	Shay Gap	VK6RSG Shay Gap	144.9000	Lysterfield	VK3RPP Melbourne
146.9750	146.3750	State Wide	VK6REE WICEN Portable	147 5250	Chirnside Park	VK3RBB Gippsland
147 0000	146.4000	Kalgoorlie	VK6RAK Kalgoorlie	147.5500	Chirnside Park	VK3RMC Melbourne
147.0000	146.4000	Fairfield	VK6RAW Katanning	147 5750	Carrajung	VK3RGU Shepparton
147.0000	146.4000	State Wide	VK6REE WICEN Portable	147 5750	Mt Wombat	VK3RMU Melbourne
147.0000	146.4000		VK6RGN Geraldton	147 5750	Mt St Leonard	VK3RNU Wodonga
147.0000	146.0000	Port Hedland	VK6RNV Port Hedland	147 5750	Mt Stanley	VK3RPA Melbourne
147.0500	147 6500	Roleystone	VK6RTY RTTY Perth	147 5750	St Albans	VK3RPC Melbourne
147 1000	147 7000	Mt Mambup	VK6RWC Perth	147 5750	Mt Warrenheip	VK3RPG Grampians
147 1750	147 7750	W A Wide	VK6RICT WICEN Portable	147 5750	Mt William	VK3RPM Bendigo
147 2000	147 8000	Catoby	VK6RICT Catoby	147 5750	Bendigo	VK4RPS Melbourne
147 2250	147 8250	Hoddywell	VK6RHW Toodyay	147 5750	Sunbury	VK4RPS Melbourne
147 2500	147 8500	Saddleback	VK6RMS Boddington	147 5750	Merbein	VK3RRU Melbourne
147 3000	147 9000	Ocean Hill	VK6REN Eneabba	147.6000	St Albans	VK3RPA Melbourne
147 3500	147 9500	Busselton	VK6RBN Busselton	147.6000	Sunbury	VK3RPS Melbourne
438.5250	433 5250	Tie Hill	VK6RTH Perth	432.4350	Mt Bainbridge	VK3RMV Melbourne
438.5250	433 5250	Roleystone	VK6RUF Perth	432.4500	Macleod	VK3RAJ Melbourne
438.5750	433 5750	Busselton	VK6RBN Busselton	439 2000	St Albans	VK3RPA Melbourne
53.8250	52.8250	Mt Duncan	VK7RMD Hobart	144.8500	Mt Coot-tha	VK4RZB Brisbane
146.6250	146 0250	Mt Duncan	VK7RAD R/Data Hobart	144.9000	Mt Archer	VK4RAR Rockhampton
146 7000	146 1000	Mt Wellington	VK7RHT Hobart	144.9000	Mt Goonaneman	VK4RBS Bundaberg
146 7500	146 1500	West Ulverstone	VK7RNV Ulverstone	144 9000	Calliope Range	VK4RGA Sunshine Coast
146 9000	146 3000	Snow Hill	VK7REC East Tas	145.0000	Wilkes Knob	VK4RBT Brisbane
147 0000	146 4000	Mt Barrow	VK7RAA NE Tas	147.6000	Mt Cotton	VK4RPA Sunshine Coast
147 2500	147 8500	Mt Faulkner	VK7RAF Hobart	147.6000	Maleny	VK4RPA Sunshine Coast
438 5000	433 5000	Barren Tier	VK7RIJ Central Tas	147 6000	Springbrook	VK4RZA Gold Coast
438 5500	433 5500	Mt Arthur	VK7RAB NE Tas	147 6000	Mt Coot-tha	VK4RZB Brisbane
438 5750	433 5750	Mt Jervis Bluff	VK7RER NE Tas	147 6000	Wilkes Knob	VK4RZC Sunshine Coast
438 6000	433 6000	Mt Nelson	VK7RTC Hobart	432 5450	Mt Perseverance	VK4RZD Toowoomba
43 8500	433 6500	Table Cape	VK7RAC NW Tas	144 5500	Mt Archer	VK4RAR Adelaide
146 6500	146.0500	Nhulunbuy	VK6RMS Gove	144.8000	Glencoe	VK4RSE Adelaide
146 7000	146 1000	Karama	VK6RDA Darwin	147.5750	Mount Lofty	VK5VF Adelaide
146.9500	146.3500	Alice Springs	VK6RCA Alice Springs	147.5750	The Bluff	VK5RMN Pt Pirie & Dist
147 0000	146.4000	Palmerston	VK6RTE Darwin	147.5750	Mount Graham	VK5RPM Naracoorte
438.2750	433.2750	Darwin	VK6RDN Darwin	52 3200	O'Halloran Hill	VK5RSV Adelaide

## PREVENT PIRATES

make sure you sell your  
transmitter to a  
licensed amateur.

# ATV Repeater List - January 1990

Output Tx1 FREQ Tx2 FREQ	Input R FREQ SITE	COVERAGE
579 2500	440.3000 Karong	VK2RTG Gosford
579.2500	444.2500 Mt Big Ben	VK3RTG Wodonga
579.2500	428.3750 Swan Hill	VK3REX Swan Hill
579.2500	426.2500 Olinda	VK3RTV Melbourne
579.2500	426.2500 Bendigo	VK3RMZ Bendigo
579.2500	426.2500 Spring Hill	VK4RTV Brisbane
579.2500	428.3750 Mt Stuart	VK4RAT Townsville
579.2500	444.2500 O'Halloran Hill	VK8RTV Adelaide
579.2500	428.3750 Roleystone	VK6RAP Perth
428.3750		
431.7500	444.2500 Mt Duncan	VK7RTV Hobart
579.2500	446.3750 Kelcey Tier	VK7RAE

## Beacons - February 1990

Freq Site		
52.4100	Mt Majura	VK1RCC
144.4100	Mt Majura	VK1RCC
432.4100	Melba	VK1RBC
1296.4100	Melba	VK2RBC
52.3250	Tighes Hill	VK2RHV
52.4200	Dural	VK2RSY
53.6250	Sugarloaf Range	VK2RSN
144.4200	Dural	VK2RSY
144.9500	Turrumurra	VK2RCW
432.4200	Dural	VK2RSY
1296.4200	Dural	VK2RSY
52.3300	Mt Anakie	VK3RGL
53.9000	Olinda	VK3RMS
144.4300	Glen Waverley	VK3RTG
144.5300	Mt Anakie	VK3RGG
144.5350	Moe	VK3RGI
144.9600	Mt Waverley	VK3RCW
146.7000	Ferny Creek	VK3RML
432.4300	Glen Waverley	VK3RTO
432.5300	Mt Anakie	VK3RGG
432.5350	Mt Buninyong	VK3RMB
52.4400	Mt St John	VK4RTL
52.4450	Mount Haren	VK4RIK
144.4000	Mt Mowbrall	VK4RTT
144.4450	Mount Haren	VK4RIK
144.4450	Mt Stuart	VK4RTL
432.4400	Mt Coot-Tha	VK4RSD
432.4450	Mount Haren	VK4RIK
1296.4400	Mt Coot-Tha	VK4RSD
1296.4450	Mount Haren	VK4RIK
52.4500	Adelaide	VK5VF
50.0660	Perth	VK6???
52.3200	Cape Lambert	VK6RTT
52.3500	Kalgoorlie	VK6RTU
52.4650	Albany	VK6RTW
144.0200	Busselton	VK6RBS
144.4650	Albany	VK6RTW
144.6500	Kalgoorlie	VK6RTU
145.0000	Cloverdale	VK6RPH
420.1000	Roleystone	VK6RAP
432.0600	Busselton	VK6RBS
432.1400	Cloverdale	VK6RPR
432.4650	Albany	VK6RTW
432.5650	Kalgoorlie	VK6RTU
434.9250	Lesmurdie	VK6RWC
1296.1800	Busselton	VK6RBS
1296.4200	Nedlands	VK6RPR
52.3700	Mt Nelson	VK7RST
62.4700	St Leonards	VK7RNT
144.4700	Newnham	VK7RMC
50.0560	Darwin	VK8VF
50.2000	Fannie Bay	VK8VF
52.4850	Alice Springs	VK8RSB
144.0100	Darwin	VK8VF
144.4850	Alice Springs	VK8RSB

## Broadcasting Stations

### Legend

The following symbols used against Australian stations denote.

\* Relays or transmits relayed programmes

+ Position not shown due to use of two transmitter towers widely separated

⦿ Power drops to 1KW at night

-T After call-sign signifies translator station

% Directional antenna

Station	Ident	Freq (kHz)	Position
<b>New South Wales</b>			
Albury	2AY	1494	36 03'S 146 58'E
Armidale *	2AD	1134	30 33'S 151 36'E
Armidale *	2AN	720	30 30'S 151 40'E
Bathurst % H24	2BS	1503	33 22'S 149 32'E
Bega *	2BA	810	36 43'S 149 49'E
Bega *	2BE	766	36 44'S 149 56'E
Bourke	2WEB	886	30 06'S 145 59'E
Bowral	2ST-T	1215	34 29'S 150 24'E
Broken Hill	2BH	567	31 56'S 141 27'E
Broken Hill % *	2NB	999	31 56'S 141 29'E
Byrock % *	2BY	657	30 39'S 146 25'E
Canberra % H24	2CA	1053	35 14'S 149 07'E
Canberra % H24	2CC	1206	35 13'S 149 07'E
Canberra *	2CN	666	35 13'S 149 07'E
Canberra *	2CY	846	35 13'S 149 07'E
Canberra	2XX	1008	35 13'S 149 07'E
Cobar	2DU-T	972	31 32'S 145 51'E
Coffs Harbour H24	2CS	639	30 29'S 153 02'E
Cooma	2XL	918	36 14'S 149 09'E
Cooma	2CP	1602	36 14'S 149 08'E
Corowa *	2CO	675	35 57'S 146 25'E
Cumnock *	2CR	549	32 56'S 148 42'E
Deniliquin	2QN	1521	35 37'S 144 55'E
Dubbo	2DU	1251	32 16'S 148 40'E
Glen Innes *	2GL	819	29 47'S 151 46'E
Gosford %	2GO	801	33 20'S 151 28'E
Goulburn	2GN	1368	34 45'S 149 42'E
Grafton %	2GF	1206	29 40'S 152 59'E
Grafton %	2NR	738	29 29'S 153 07'E
Grafton %	2RG	963	34 20'S 146 08'E
Gunnedah	2MO	1080	30 59'S 150 13'E
Inverell	2NZ	1186	29 47'S 151 13'E
Katoomba	2KA	783	33 43'S 150 23'E
Kempsey %	2MC	531	31 06'S 152 50'E
Kempsey *	2KP	684	31 00'S 152 57'E
Lismore	2LM	900	28 46'S 153 21'E
Lithgow %	2LG	1395	33 29'S 150 09'E
Lithgow %	2LT	900	33 24'S 150 08'E
Morée	2VM	1530	29 29'S 149 54'E
Moruya	2BE-T	765	35 51'S 150 08'E
Mudgee % H24	2MG	1449	32 35'S 149 34'E
Murwillumbah *	2ML	720	28 15'S 153 30'E
Murwillumbah %	2MW	972	28 19'S 153 30'E
Muswellbrook %	2NM	981	32 18'S 150 50'E
Muswellbrook % *	2UH	1044	32 14'S 150 55'E
Narooma	2BE-T	1584	36 14'S 150 09'E
Newcastle H24	2HD	1143	32 52'S 151 42'E
Newcastle H24	2KO	1413	32 51'S 151 42'E
Newcastle *	2NA	1512	32 48'S 151 40'E
Newcastle	2EA	1584	32 52'S 151 42'E
Newcastle *	2NC	1233	32 48'S 151 40'E
Nowra %	2ST	999	34 53'S 150 32'E
Orange %	2GZ	1089	33 27'S 149 07'E
Parke	2PK	1404	33 10'S 148 13'E
Penrith	2KA-T	1476	33 44'S 150 40'E
Sydney *	2BL	702	33 56'S 150 53'E
Sydney H24	2CH	1170	33 51'S 151 05'E
Sydney %	2EA	1386	33 50'S 151 04'E
Sydney *	2FC	576	33 56'S 150 53'E
Sydney H24	2GB	873	33 49'S 151 05'E
Sydney H24	2KY	1017	33 50'S 151 04'E
Sydney H24	2SM	1269	33 50'S 151 04'E
Sydney H24	2UE	954	33 51'S 151 04'E

Sydney H24	2UW	1107	33 51'S	151 05'E	Gympie %	4GY	558	26 10'S	152 50'E
Sydney % H24	2WS	1224	33 48'S	150 55'E	Hughenden *	4HU	1485	20 51'S	144 11'E
Tamworth	2TM	1287	31 10'S	150 55'E	Hughenden	4GC-T	765	20 51'S	144 11'E
Tamworth *	2NU	648	30 47'S	150 44'E	Innisfail %	4KZ	531	17 32'S	146 03'E
Taree *	2TR	756	31 50'S	152 25'E	Julia Creek % *	4JK	567	20 39'S	141 49'E
Taree	2RE	1567	31 55'S	152 28'E	Kingaroy *	4SB	1071	26 24'S	151 50'E
Wagga Wagga	2WG	1162	35 02'S	147 25'E	Longreach	4LG	1098	23 23'S	144 17'E
Wailsend % H24	2NX	1341	33 53'S	151 41'E	Longreach *	4QL	540	23 23'S	144 17'E
Wilcanna *	2WA	1584	31 33'S	143 32'E	Mackay %	4QA	756	21 06'S	149 13'E
Wollongong	2EA	1485	34 32'S	150 47'E	Mackay %	4MK	1026	21 07'S	149 13'E
Wollongong H24	2WL	1314	34 31'S	150 47'E	Maryborough	4MB	1161	25 28'S	152 44'E
Wollongong *	2WN	1431	34 32'S	150 47'E	Moranbah	4HI-T	1215	22 00'S	148 02'E
Wollongong %	2OO	1575	34 29'S	150 47'E	Mossman *	4MS	639	16 25'S	145 23'E
Young %	2LF	1350	34 20'S	148 20'E	Mount Isa	4LM	666	20 43'S	139 30'E
					Mount Isa *	4MI	1080	20 40'S	139 30'E
					Nambour %	4SS	828	26 38'S	153 05'E
<b>Victoria</b>					Oakey	4AK	1242	27 28'S	151 45'E
Albury/Wodonga	3AB	990	36 06'S	146 54'E	Pialba %	4QB	855	25 16'S	152 49'E
Ballarat % H24	3BA	1314	37 32'S	143 56'E	Rockhampton *	4RK	837	23 27'S	150 27'E
Bendigo	3BO	945	36 42'S	144 13'E	Rockhampton	4RO	990	23 35'S	150 51'E
Colac %	3CS	1134	38 19'S	143 32'E	Roma	4ZR	1476	26 33'S	148 49'E
Geelong %	3GL	1341	38 10'S	144 27'E	Southport *	4SO	1593	28 02'S	163 28'E
Hamilton	3HA	961	37 41'S	142 01'E	St George % *	4QW	711	28 00'S	148 40'E
Horsham %	3WM	1089	36 45'S	143 34'E	Thursday Island *	4TI	1062	10 35'S	142 13'E
Horsham	3MW	594	36 39'S	142 16'E	Toowoomba H24	4GR	864	27 36'S	151 55'E
Maryborough % *	3CV	1071	37 02'S	143 49'E	Townsville % H24	4AY	891	19 19'S	147 02'E
Melbourne % H24	3AK	1503	37 45'S	145 06'E	Townsville % H24	4TO	774	19 19'S	147 02'E
Melbourne *	3AR	621	37 43'S	144 47'E	Townsville % H24	4QN	630	19 31'S	147 20'E
Melbourne H24	3AW	1278	37 44'S	145 06'E	Tully	4KZ-T	693	18 00'S	145 56'E
Melbourne	3CR	855	37 49'S	145 00'E	Warwick %	4WK	963	28 01'S	151 59'E
Melbourne	3EA	1224	37 37'S	144 56'E	Weipa	4WP	1044	12 37'S	141 53'E
Melbourne H24	3KZ	1179	37 44'S	145 07'E					
Melbourne *	3LO	774	37 43'S	144 47'E					
Melbourne *	3MP	1377	37 56'S	145 13'E	<b>South Australia</b>				
Melbourne % H24	3TT	1026	37 44'S	145 06'E	Adelaide % H24	5AA	1386	34 45'E	138 36'E
Melbourne H24	3UZ	927	37 44'S	145 06'E	Adelaide % H24	5AD	1323	34 50'S	138 36'E
Melbourne H24	3XY	1422	37 44'S	145 06'E	Adelaide *	5AN	821	35 06'S	138 31'E
Mildura	3MA	1467	34 11'S	142 07'E	Adelaide %	5CL	729	35 06'S	138 31'E
Omeo % *	3MT	720	37 09'S	147 40'E	Adelaide H24	5DN	972	34 50'S	138 34'E
Sale %	3TR	1242	38 03'S	147 02'E	Adelaide *	5KA	1197	34 50'S	138 35'E
Sale *	3GI	828	38 11'S	147 06'E	Adelaide	5UV	531	34 50'S	138 35'E
Shepparton	3SR	1260	36 23'S	145 32'E	Crystal Brook *	5PI	1044	33 19'S	138 16'E
Swan Hill	3SH	1332	36 25'S	143 34'E	Leigh Creek South *	5LC	1602	30 36'S	138 24'E
Wangaratta %	3NE	1666	36 19'S	146 22'E	Mount Gambier *	5MG	1584	37 49'S	140 47'E
Warragul %	3UL	531	38 06'S	145 56'E	Mount Gambier % * H24	5SE	963	37 48'S	140 43'E
Warrnambool %	3YB	882	38 20'S	142 30'E	Murray Bridge *	5MU	1458	35 07'S	139 15'E
Warrnambool *	3WL	1602	38 22'S	142 30'E	Narracorte % *	5PA	1161	36 57'S	140 40'E
					Port Augusta % *	5AU	1242	32 50'S	137 56'E
					Port Lincoln *	5LN	1485	34 44'S	135 53'E
<b>Queensland</b>					Port Pirie *	5CK	639	33 21'S	138 15'E
Atherton %	4AM	558	17 02'S	145 29'E	Renmark *	5MV	1305	34 16'S	140 37'E
Atherton *	4AT	720	17 18'S	145 33'E	Renmark *	5RM	801	34 14'S	140 35'E
Biloela *	4CC-T	927	24 24'S	150 30'E	Streaky Bay % *	5SY	693	32 45'S	134 12'E
Brisbane % H24	4BC	1116	27 32'S	152 58'E	Tumby Bay H24	5CC	765	34 15'S	138 20'E
Brisbane % H24	4BH	882	27 28'S	153 09'E	Woomera *	5WM	1584	31 12'S	136 49'E
Brisbane % * H24	4BK	1296	27 28'S	153 07'E					
Brisbane	4EB	1053	27 31'S	153 00'E					
Brisbane H24	4IO	1008	27 23'S	153 14'E	<b>Western Australia</b>				
Brisbane %	4KQ	693	27 23'S	153 14'E	Albany *	6AL	630	35 01'S	117 49'E
Brisbane *	4QG	792	27 19'S	153 01'E	Albany	6VA	783	35 01'S	117 51'E
Brisbane *	4QR	612	27 19'S	153 01'E	Bridgetown *	6BY	900	34 03'S	116 10'E
Bundaberg %	4BU	1332	24 51'S	152 24'E	Bridgetown *	6BR	1044	35 56'S	116 07'E
Cairns %	4CA	846	16 54'S	145 49'E	Broome *	6BE	675	17 58'S	122 14'E
Cairns *	4QY	801	17 03'S	145 47'E	Bunbury *	6TZ	963	33 21'S	115 45'E
Charleville	4VL	918	26 23'S	146 12'E	Busseton *	6BS	684	33 39'S	115 13'E
Charters Towers	4GC	828	20 04'S	146 18'E	Carnarvon *	6CA	846	24 52'S	113 40'E
Cloncurry	4LM-T	1458	20 42'S	140 30'E	Carnarvon	6LN	666	24 52'S	113 40'E
Cunnamulla	4VL-5	1584	28 07'S	145 41'E	Collie *	6CI	1134	33 22'S	116 11'E
Dalby	4QS	747	27 09'S	151 18'E	Dalwallinu *	6DL	531	30 17'S	116 36'E
Dysart %	4HI-5	945	22 35'S	148 22'S	Derby *	6DB	873	17 21'S	123 40'E
Endsvoid %	4QO	855	25 24'S	151 07'E	Esperance	6ED	837	33 45'S	121 51'E
Emerald *	4QD	1548	23 26'S	148 09'E	Esperance %	6SE	747	33 46'S	121 52'E
Emerald %	4HI	1143	23 32'S	148 12'E	Exmouth *	6XM	1188	21 58'S	114 08'E
Gladstone % *	4CC	927	23 51'S	151 14'E	Exmouth	6LN-T	747	21 58'S	114 08'E
Gold Coast %	4GG	1197	28 00'S	153 24'S	Geraldton	6GE	1008	28 44'S	114 37'E
Gordonvale	4CA-T	954	17 08'S	145 51'E	Geraldton *	6GN	828	28 44'S	114 37'E
Gympie %	4GM	1566	28 13'S	152 41'E					

# Radio Australia (RA) Transmission Schedule

## RA Transmitters

Radio Australia broadcasts through transmitting stations at Shepparton, Carnarvon and Darwin

## ASIA

### English Service

23 hours daily reaching Bangladesh, Brunei, Burma, China, Hong Kong, India, Indonesia, Kampuchea, Korea, Laos, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand and Vietnam

0000 - 0100	15240 kHz
0100 - 0900	21720 kHz
0100 - 0910	17715 & 17750 kHz
0900 - 1100	17830 kHz
0900 - 1130	11895 kHz
1100 - 1330	9770 kHz
1200 - 1730	7205 kHz
1330 - 1530	9580 kHz
1400 - 1530	6035 kHz
1530 - 1730	9770 kHz
1530 - 2100	6035 kHz
1800 - 2100	7215 kHz
2200 - 2400	15240 kHz
0000 - 0900	15395 kHz

Broadcasting through Carnarvon, Darwin and Shepparton

## PAPUA NEW GUINEA

### Programs in English

Times shown are universal time coordinated.

Add for Local Time: +9 Irian Jaya, +10 Papua New Guinea, Bathurst and Melville Island, +11 Vanuatu.

### English Service

Twenty-three hours daily reaching Papua New Guinea, Irian Jaya, Vanuatu, Bathurst and Melville Islands. Includes broadcasts in widely used regional English.

### Regional English:

0800 - 0945 6080, 9760 & 5995 kHz

### English:

0100 - 0930	15165 kHz
0900 - 1000	11800 kHz
1100 - 1300	11800 & 9710 kHz
1200 - 2030	6080 kHz
1400 - 1600	11800 & 9710 kHz
2000 - 2130	9620 kHz
2100 - 2400	15160 kHz
2330 - 0230	17725 kHz

### English Service (continuous broadcasts)

0130 - 0530	17715 kHz
0200 - 0730	17795 kHz
0300 - 0800	15160 kHz
0400 - 0700	15320 kHz
0600 - 0840	11910 kHz
0730 - 0930	11720 kHz
0800 - 2130	9580 kHz
0800 - 2000	6045 kHz
1100 - 2000	5995 kHz
1200 - 2030	6060 kHz
1800 - 2100	7215 kHz
2100 - 0100	17795 & 15160 kHz
2100 - 0730	15395 kHz
2100 - 1000	15240 kHz
2200 - 0100	15320 kHz

## PACIFIC

### Programs in English.

Times shown are universal time coordinated.

Add for Local Time: +10 Micronesia, Guam; +11 New Caledonia, Micronesia, Vanuatu, Solomon Islands, Wallis and Futuna; +11 30 Norfolk Island, Nauru; +12 New Zealand, Kiribati, Fiji, Tuvalu, +13 Tonga.

Subtract for Local Time: -10 Cook Islands, French Polynesia, Hawaii, -11 Niue, Western Samoa and American Samoa.

## AFRICA

Programs in English and French reaching Western and Southern Africa.

Times shown are universal time coordinated.

Kalgoorlie *	6GF	648	30 47'S	121 24'E
Kalgoorlie	6KG	981	30 44'S	121 30'E
Karratha	6KA	1260	20 44'S	116 50'E
Katanning *	6WB	1071	33 39'S	117 30'E
Kununurra *	6KW	756	15 46'S	128 44'E
Mandurah	6MM	1116	32 38'S	115 48'E
Manjimup %	6MJ	738	34 19'S	116 08'E
Merredin *	6MD	1098	31 30'S	118 12'E
Mount Newman *	6MN	567	23 21'S	119 44'E
Mount Tom Price *	6TP	567	22 42'S	117 46'E
Mount Tom Price *	6KA-T	765	22 42'S	117 46'E
Narrogin *	6NA	918	32 58'S	117 13'E
Northam *	6AM	864	31 40'S	116 37'E
Northam *	6NM	612	31 40'S	116 41'E
Pannawonica *	6PN	567	21 40'S	116 20'E
Paraburdoo *	6PU	567	21 13'S	117 40'E
Paraburdoo *	6KA-T	765	23 13'S	117 40'E
Perth * H24	6IX	1080	31 56'S	115 55'E
Perth * H24	6KY	1206	31 56'S	115 55'E
Perth %	6NR	927	32 01'S	115 54'E
Perth * H24	6PM	990	32 00'S	115 50'E
Perth * H24	6PR	882	32 00'S	115 49'E
Perth *	6WF	720	31 51'S	115 49'E
Perth *	6WN	810	31 51'S	115 49'E
Port Hedland *	6PH	603	20 24'S	118 40'E
Port Hedland	6NW	1026	20 23'S	118 35'E
Wagin *	6WA	558	33 20'S	117 05'E
Wyndham *	6WH	1017	15 28'S	128 06'E

## Tasmania

Burnie	7BU	558	40 58'S	145 44'E
Devonport	7AD	900	41 10'S	146 19'E
Fingal % *	7FG	1161	41 41'S	147 52'E
Hobart	7HO	864	42 55'S	147 19'E
Hobart %	7HT	1080	42 56'S	147 30'E
Hobart %	7ZL	585	42 55'S	147 30'E
Hobart % *	7ZR	936	42 55'S	147 30'E
Kelso % *	7NT	711	41 06'S	146 47'E
Launceston %	7EX	1008	41 27'S	147 13'E
Launceston	7LA	1098	41 23'S	147 09'E
Queenstown *	7QN	630	42 03'S	145 31'E
Queenstown	7QT	837	42 06'S	145 32'E
Saint Helena *	7SH	1584	41 20'S	148 17'E
Scottsdale %	7SD	540	41 06'S	147 32'E

## Northern Territory

Alice Springs	8HA	900	23 46'S	133 52'E
Alice Springs *	8AL	783	23 46'S	133 52'E
Alice Springs	VL8A	2310	Ngt	23 49'S 133 51'E
		4835	Day	
Darwin	8DN	1242	12 26'S	130 51'E
Darwin	8DR	857	12 25'S	130 51'E
Gove *	8GO	990	12 11'S	136 47'E
Jabiru *	8JB	747	12 40'S	132 53'E
Katherine * H24	8KN	639	14 24'S	132 11'E
Katherine*	8DN-T	765	14 27'S	132 16'E
Katherine	VL8K	2485	Ngt	14 24'S 132 11'E
		5025	Day	
Tennant Creek* H24	8TC	684	19 40'S	134 11'E
Tennant Creek	VL8T	2325	Ngt	19 40'S 134 16'E
		4910	Day	

## Note:

8DR transmits on 857 kHz 12 39'40"S 131 02'13"E every Tuesday b/n 1430Z and 1530Z. 8DN freq 765 kHz retransmits 8DN 1242 kHz programs to Katherine

Add for Local Time: +1 Cameroon, Nigeria, Zaïre; +2 Botswana, Lesotho, Malawi, South Africa, Zambia and Zimbabwe; +3 Djibouti, Ethiopia, Kenya, Madagascar, Tanzania, Uganda, +4 Mauritius, Seychelles.

#### English Service

Three-and-a-half hours daily

0400 - 0730 17865 kHz

Broadcast through Shepparton.

0300 - 0400 15320 & 17865 kHz

Broadcast through Shepparton

#### RA NEWS REPORTING

#### English Service

World News ten-minute bulletins every hour on the hour

World and Pacific News ten-minute bulletins at 0900, 1000, 1800, 1900 and 2000 on frequencies directed to the Pacific

Australian News ten-minute bulletins at 0130, 0430, 0830, 1230, 1630, 1830, 2030 and 2330

Report from Asia, background to the news from RA correspondents Saturday 1410, 1710, 2010 and 2310.

The Week in Canberra: News from the Australian national capital. Friday 1410, 1810, 2010 and 2210.

#### International TV Frequencies (MHz) VHF

New Zealand		Frequency	
VHF	Channel	Vision	Sound
Band I	2	45.25	50.75
	3	55.25	60.75
	4	62.25	67.75
Band III	4	175.25	180.75
	5	182.25	187.75
	6	189.25	194.75
	7	196.25	201.75
	8	203.25	208.75
	9	210.25	215.75

#### European (CCIR)

Channel	Frequency	Sound
E2	48.25	53.75
E3	55.25	60.75
E4	62.25	67.75
E5	175.25	180.75
E6	182.25	187.75
E7	189.25	194.75
E8	196.25	201.75
E9	203.25	208.75
E10	210.25	215.75
E11	217.25	222.75
E12	224.25	229.75

#### UK

Channel	Frequency	Sound
	Vision	Sound
B1	45.00	41.50
B2	51.75	48.25
B3	56.75	53.25
B4	61.75	58.25
B5	66.75	63.25
B6	179.75	176.25
B7	184.75	181.25
B8	189.75	186.25
B9	194.75	191.25
B10	199.75	196.25
B11	204.75	201.25
B12	209.75	206.25
B13	214.75	211.25

#### Australian UHF Frequencies

Band IV	between 520-585 MHz
Band V	between 614-820 MHz

#### Notes

1. B IV will be used for Main Stations

2. B V will be used for Translators

3. Planned for 7 MHz channels.

#### CCIR-UHF Frequencies

Europe, the UK and many other countries utilize the same band IV and Band V Frequencies

Channel	Band IV	(CCIR)
	Vision	Sound
21.	471.25	477.75
22.	479.25	485.75
23.	487.25	493.75
24.	495.25	501.75
25.	503.25	509.75
26.	511.25	517.75
27.	519.25	525.75
28.	527.25	533.75
29.	535.25	541.75
30.	543.25	549.75
31.	551.25	557.75
32.	559.25	565.75
33.	567.25	573.75
34.	575.25	581.75
35.	583.25	589.75
36.	591.25	597.75
37.	599.25	605.75
38.	607.25	613.75
39.	615.25	621.75
40.	623.25	629.75
41.	631.25	637.75
42.	639.25	645.75
43.	647.25	653.75
44.	655.25	661.75
45.	663.25	669.75
46.	671.25	677.75
47.	679.25	685.75
48.	687.25	693.75
49.	695.25	701.75
50.	703.25	709.75
51.	711.25	717.75
52.	719.25	725.75
53.	727.25	733.75
54.	735.25	741.75
55.	743.25	749.75
56.	751.25	757.75
57.	759.25	765.75
58.	767.25	773.75
59.	775.25	781.75
60.	783.25	789.75
61.	791.25	797.75
62.	799.25	805.75
63.	807.25	813.75
64.	815.25	821.75
65.	823.25	829.75

## Television Frequencies

Australia		Frequency	
VHF	Channel	Vision	Sound
Band I	0	46.25	51.75
	1	57.25	62.75
	2	64.25	69.75
VHF	3	86.25	91.75
	4	95.25	100.75
	5	102.25	107.75
Band II	5A	138.25	143.75
	6	175.25	180.75
	7	182.25	187.75
Band III	8	189.25	194.75
	9	196.25	201.75
	10	209.25	214.75
	11	216.25	221.75

## ARRL DXCC COUNTRIES LIST

Note Third party traffic permitted with special events stations in the United Kingdom having the prefix GB only, with exception that GB3 stations are not included in this agreement

Note \* Indicates current list of countries for which QSLs may be forwarded by the ARRL membership outgoing QSL service

Note † Indicates countries with which US amateurs may legally handle third-party message traffic.

PREFIX	COUNTRY	PREFIX	COUNTRY	PREFIX	COUNTRY
A2*	Botswana	CA-CB†	Chile	D4*	Cape Verde
A3	Tonga	CEB/KC-AL	Antarctica	D6*	Comora
A4*	Oman	CEB*	Easter Is	DU-DL2*	Fed Rep of Germany
A5	Bhutan	CEB*	San Felix	DU-DZ*	Philippines
A6	United Arab Emirates	CEB††	Juan Fernandez	EA-EH*	Spain
A7	Qatar	CM,CO††	Cuba	EA6-EH6*	Canary Is
A9*	Bahrain	CN*	Morocco	EA8-EH8*	Baleares Is
AP-AS	Pakistan	CP†*	Bolivia	EA9-EH9*	Ceuta* and Melilla
BV	Tuvalu	CT*	Portugal	EI-EJ*	Ireland
BY,BT,BZ*	China	CT3*	Madeira Is	EL*	Liberia
C2*	Nauru	CU*	Azores	EP-EQ*	Iran
C3*	Andorra	CV-CX††	Uruguay	ET	Ethiopia
C5†*	The Gambia	CY0	Sable Is	F*	France
C6*	Bahamas	CY0	St Paul Is	FTSW*	Gozet
C8-9	Mozambique	D2-3*	Angola	FTSX*	Kerguelen Is

PREFIX	COUNTRY	PREFIX	COUNTRY	PREFIX	COUNTRY
PT5Z*	Amsterdam & St Paul Is	OH0*	Aland Is	VK91*	Melish Reef
FG*	Guadeloupe	OJ0*	Market Reef	VK91*	Norfolk Is
FJ.FS1*	Saint Martin	OK-OM*	Czechoslovakia	VK91*	Heard Is
FK**	Mayotte	ON-OT*	Belgium	VK91*	Macquarie Is
FK*	New Caledonia	OX*	Greenland	VP2E1*	Anguilla
FM*	Martinique	OY*	Faroe Is	VP2M1*	Montserrat
FO*	Chipperton Is	OX*	Denmark	VP2V1*	Brit Virgin Is
FO*	French Polynesia	P2**	Papua New Guinea	VP5*	Turks & Caicos Is
FP*	St Pierre & Miquelon	P4**	Aruba	VP8*	Falkland Is
FR/G*	Glorioso Is	PA-PJ*	Netherlands	VP8.LU*	North Georgia Is
FR/J.E*	Juan de Nova, Europe	PJ.2,4,9*	Bonaire	VP8.LU*	South Orkney Is
FR*	Reunion		Curacao (Neth Antilles)	VP8.LU*	South Sandwich Is
FRT*	Tromelin		St Maarten, Saba, St Eustatius	VP8.CE9.HF0, LU.4K1*	
FW*	Wallis & Futuna Is	PJ5-6*	Brazil	VP9*	South Shetland Is
FY*	French Guiana	PP-PY1*	Fernando de Noronha	VP9*	Bermude
G2*	England	PP0-PY01*	St Peter & St Paul Rocks	VR6*	Chagos
GD*	Isle of Man	PP0-PY01*	Trinidad & Martin Vaz Is	V86*	Pitcairn Is
GI*	Northern Ireland	PP0-PY01*	Surname	VU*	Hong Kong
GJ*	Jersey	FZ*	Bangladesh	VU*	India
GM*	Scotland	SS*	Seychelles	VU*	Andaman & Nicobar Is
GU*	Gosnauy & Dep	ST*	Sao Tome & Principe	VU*	Laccadive Is
GW*	Wales	S0	Western Sahara	XA-XI1*	Mexico
H4*	Solomon Islands	SD3**	Sweden	XA4-X14*	Revilla Gigeo
HA.HQ*	Hungary	SA-SM*	Poland	XT*	Burkina Faso
HB*	Switzerland	SN-SR*	Sudan	XU	Kampuchea
HB0	Liechtenstein	ST*	Southern Sudan	XW	Laoe
HC-HD1*	Ecuador	ST0*	Egypt	XK9	Macao
HC6-HD51*	Galapagos Is	SU*	Greece	XY-XZ	Burma
HN1*	Haiti	SV-SZ*	Dodecanese	Y2-Y0*	German Dem Rep
HI*	Dominican Rep	SV5*	Crete	YA	Afghanistan
HJ-HK1*	Colombia	SV9*	Mount Athos	YB-YH1*	Indonesia
HK01*	Malpelo Is	SWA*	Tuvalu	YI*	Iraq
HK01*	San Andreas & Providencia	T21*	W Kiribati (Gilbert & Oen Is)	YJ*	Vanuatu
HL*	Korea	T30	E Kiribati (Brit Phoenix Is)	YK*	Syria
HO-HP1*	Panama	T31	Somalia	YN1*	Nicaragua
HQ-HR1*	Honduras	T32	San Marino	YO-YR*	Romania
HS*	Thailand	T6	Turkey	YS*	El Salvador
HV*	Vatican	T7*	Iceland	YT-YU,YZ*	Yugoslavia
HZ	Saudi Arabia	TA-TC*	Guatemala	YV-YT1*	Venezuela
I*	Italy	TF	Costa Rica	YV01*	Aves Is
IS0,IM0*	Sardinia	TG,TD1*	Cocos Is	Z*	Zimbabwe
J2*	Djibouti	TL,TE1*	Cameroon	ZB*	Gibraltar
J31*	Grenada	T191*	Comoros	ZC4*	UK Sov Base Aress on Cyprus
J8	Guinea-Bissau	T2	Corcia	ZD7	St Helena
J81*	St Lucia	TK*	Central African Rep	ZD8*	Ascension Is
J71*	Dominica	TL2	Congo	ZD9	Tristan da Cunha & Gough Is
J81*	St Vincent & Dep	TN*	Gabon	ZF*	Cayman Is
JA-JS*	Japan	TR2*	Chad	ZK1*	Stk Cook Is
JD11*	Minami Torishima	TT1*	Ivory Coast	ZK1*	Nth Cook Is
JD1*	Ogasawara	TU1*	Benin	ZK2	Nue
JT-JV*	Mongolia	TY2*	Mali	ZK3	Tokelau Is
JW*	Svalbard	TZ1*	European Russian RSFSR	ZL-ZM*	New Zealand
JX*	Jen Mayen	UA1,3,4,0*	Franz Josef Land	ZL7*	Chatham Is
JY1*	Jordan	UA2*	Kaliningrad	ZL8*	Kermadec Is
K.W.N.AA-AAK	United States of America	UA9,0	Asiatic RSFSR	ZL9*	Auckland & Campbell Is
KC0*	Ref V6	UB, UT,UY*	Ukraine	ZP1*	Paraguay
KC0*	(W Caroline Is) Belau	UC*	Byelorussia	ZR-ZU*	South Africa
KG41*	Guantanamo Bay	UD*	Azerbaijan	ZR2-ZU2*	Prince Edward & Marion Is
KH1*	Baker, Howland Is	UF*	Georgia	ZR3-ZU3*	(Namibia) SW Africa
KH2*	Guam	UG*	Armenia	1A01	Sov. Mt. Order of Malta
KH3*	Johnston Is	UH*	Turkmenistan	1S1	Sprally Is
KH4*	Midway Is	UI*	Uzbekistan	3A*	Macao
KH5*	Palmyra, Jarvis Is	UJ*	Tadzhikistan	3B6,7*	Alegale & St Brandon
KH8K1*	Kingman Reef	UK*	Kashukistan	3B8*	Mauritius
KH6*	Hawanna Is	UL*	Kirghizia	3B9*	Rodrigues Is
KH7*	Kure Is	UM*	Moldavia	3C	Equatorial Guinea
KH8*	American Samoa	UO*	Latvia	3C0	Pagaj Is
KH9*	Wake Is	UP*	Estonia	3D2*	Fip & Rotuma Is
KH01*	Mariana Is	UQ*	Antigua & Barbuda	3D61*	Swaziland
KH71*	Alaska	UR*	Belize	3V	Tunisia
KP1*	Navassa Is	V21*	St Christopher & Nevis	3W.XV	Vietnam
KP21*	Virgin Is	V31*	Federated States of	3X	Gunes
KP41*	Puerto Rico	V41*	Micronesia (ref KC0)	3Y*	Bouvet
KP51*	Deesecho Is	V6	Marshall Is (ref KC0)	4J1	Peter Is
KX6*	Ref V7	V7	Brunei	4P-4S*	Maly Vystotky Is
LA-LN*	Norway	V8*	Canada	4U1*	Sri Lanka
LO-LW1*	Argentina	VE,VO,VY1*	Australia	4U	ITU Geneva
LX*	Luxembourg	VK1*	Lord Howe Is	4W	HQ, United Nations
LZ*	Bulgaria	VK1*	Willis Is	4X,4Z1*	Yemen
OA-OC1*	Peru	VK91*	Christmas Is	6A	Israel
OD*	Lebanon	VK91*	Cocos-Keeling Is	6B*	Libya
OE*	Austria	VK91*		6C1-51	Cyprus
OF-OJ*	Finland				Tanzania



Contacts made September 16, 1963 and after, count as West Malaysia (9M2) or East Malaysia (9M6,8).  
32 (V59H) Only contacts made November 29, 1967 and before, count for this country  
33 (ZC6,4X1) Only contacts made June 30, 1968 and before, count for this country Contacts made July 1968 and after, count as Israel (4X).  
34 (ZD4) Only contacts made March 5, 1957 and before, count for this country  
35 (1M) Only contacts made July 15, 1972 and before, count for this country. Contacts made July 16, 1972 and after, count as Tonga (A3).  
36 (7O/V89K) Only contacts made March 10, 1982 and before, count for this country.  
37 (824) Only contacts made December 26, 1981 and before, count for this country.  
38 (8Z5,9K3) Only contacts made December 14 and before, count for this country  
39 (9S4) Only contacts made MARCH 31, 1967 and before, count for this country  
40 (9U) Only contacts made July 1, 1960 to June 30, 1963, count for this country Contacts made July 1, 1962 and after, count as Burundi (9U) or Rwanda (9X).  
41 (Blenheim Reef) Only contacts made A4, 1967 to June 30, 1975, count for this country Contacts made July 1, 1975 and after, count as Chagos (VQ9).  
42 (Ceyser Reef) Only contacts made May 4, 1967 to February 28 1978 count for this country

## Prefix Cross References

AC = EL  
AC before 1972) = A5  
AH = KH  
AL7 = JKL7  
AM-AO = EA  
AT-AW = VU  
AX = VK  
AY-AZ = LU  
CF-CK = VE  
CL = CO  
CQ-CS = CT  
CR3 before 1974 = J5  
CR4 before 1976) = D4  
CR5 before 1976) = S9  
CR6 before 1976 = D2  
CR7 before 1976) = C8  
CR9 before 1985) = XX9  
CT2 before 1986) = CU  
CZ = CVP/CP  
CY-CZ = VE  
CY9 before 1985) = CY0  
DM-DT before 1980) = Y2-9  
E0 before 1969) = 3C  
EK, EM, EO, ER-ES, EU-EZ = U  
FA-FF (after 1961) = F  
FA before 1963) = 7X  
F8 before 1961) = 6R  
F8 before 1985) = FT  
FC before 1985) = TK  
F8 before 1961 = 5V  
F8 before 1961) = TJ  
FL before 1978) = J2  
FLU before 1982 = YJ  
GB = G  
GC before 1977) = GJ/GU  
H2 = 5B  
H3 = HP  
H5 Bophutawanna, = ZS  
H7 = YN  
HE = HB  
HM before 1992) = HL  
HT = YN  
HU = YS  
HW HY = F  
JA = SV  
K4 = JD1  
KAZAA-KARZZ = JA  
K6 before 1979) = KH1  
K6 (Navassa) = KP1  
KC4 before 1979) = KH2

KIGER,S,T (before 1970) = JD1  
 KJ6R,S,T (before 1979) = KH0  
 KJ6 (before 1979) = KH3  
 KJ6 (before 1979) = KH4  
 KP4 (Desacchoe) = KP5  
 KP4 (before 1979) = KH5  
 K56 (before 1979) = KH8  
 KV4 (before 1979) = KP2  
 KW6 (before 1979) = KH9  
 L2-9 = LU  
 LY = LP  
 M1 (before 1984) = T7  
 MP4B (before 1972) = A9  
 MP4M (before 1972) = A9  
 MP4T (before 1972) = A7  
 MP4T (before 1972) = A6  
 NH = KH  
 NT.7 = KL.7  
 NP = KP  
 OQ (before 1961) = 9Q  
 PR (before 1986) = PJ  
 PX (before 1970) = C3  
 RA,RN = UA  
 RH,RH = UH,UH  
 RS-RZ = U  
 S4 (Cusken) = ZS  
 SS (Transekai) = ZS  
 T4 = CO  
 T4 (Venda) = ZS  
 TH,TM,TQ,TU,TX = F  
 UN,UV,UW,UZ = UA  
 V9 (Venda) = ZS  
 VA-VG = VE  
 VH-VN = VK  
 VSH (Nauru) = C2  
 VP4 (before 1982) = V3  
 VP2A (before 1982) = V7  
 VP2D (before 1979) = J2  
 VP2G (before 1975) = J3  
 VP2K (before 1984) = V4 or VP  
 VP2L (before 1980) = J6  
 VP2S (before 1980) = J8  
 VP3 (before 1967) = 8Y  
 VP4 (before 1963) = 9Y  
 VP6 (Jamaica) = 6Y  
 VP6 (before 1967) = 8P  
 VP7 (before 1974) = 8P  
 VQ1 (before 1965) = 9J  
 CQ4 (before 1964) = 5Z  
 VQ6 (before 1963) = 6X  
 VQ6 (before 1969) = 3B  
 VQ8 (Chagoe) = VQ9  
 VQ9 (Seychelles) = S7  
 VR1 (before 1980) = T3/31  
 VR2 (before 1971) = 3D2  
 VR3 (before 1980) = T32  
 VR4 (before 1979) = S4  
 VR5 (before 1971) = A3  
 VR8 (before 1979) = T2  
 VS1 (before 1966) = 9V  
 VS5 (before 1965) = 9V  
 VS7 (before 1949) = 4S  
 VS8A,P,S (before 1968) = T0  
 VS8M = 8Q  
 VS8O (before 1961) = A4  
 VX-VY = CY/VE  
 WH = KH  
 WL.7 = KL.7  
 WP = KP  
 XJ-XO = VE  
 XP = OX  
 QX-QR = CE  
 XV = 3W  
 XY (before 1976) = C9  
 LY = UO  
 Z1 (before 1965) = 9H  
 ZD1 (before 1962) = 9L  
 ZD2 (before 1961) = 5N  
 ZD3 (before 1966) = C5  
 ZD4 (before 1965) = 9G  
 ZD5 (before 1969) = 3D6  
 ZD6 (before 1965) = Q7  
 ZE (before 1981) = Z2-9  
 ZK9 (1983) = ZK2

ZM6 (before 1963) = 5W  
ZM7 (before 1984) = ZK3  
ZS7 (before 1968) = 3D6  
ZS8 (before 1967) = 7P  
ZS9 (before 1967) = A2  
ZV-ZZ = PY  
3B-3C (before 1968) = VE  
3G = CE  
3Z = SP  
4A-4C = XE  
4D-RI = DU  
4J-4L = U  
4M = YV  
4N-4Q = YU  
4T - OA  
4U1VIC = OE  
4V = HH  
5J-5K = HK  
5L-5M = EL  
6C = YK  
6D-6J = XE  
6O = T5  
6T-6U = ST  
7A-7I = YB  
7G (before 1967) = 3X  
7J-7N = JA,JD  
7S = SM  
7Z = HZ  
8A-8I = YB  
8J-8N = JA  
8O = A2  
8S = SM  
9A (before 1984) = T7  
9B-9D = EP  
9E-9F = ET

## Allocation of International Call Signs

Call Sign	Allocated To
AAA-ALZ	United States of America
AMA-AOZ	Spain
APA-ASZ	Pakistan (Islamic Rep of)
APA-AWZ	India (Rep of)
AXA-AXZ	Australia
AYA-AZZ	Argentine Republic
AZA-AZZ	Botswana (Rep of)
A3A-A3Z	Tonga (Kingdom of)
A4A-A4Z	Oman (Sultanate of)
A5A-A5Z	Bhutan (Kingdom of)
A6A-A6Z	United Arab Emirates
A7A-A7Z	Qatar (State of)
A8A-A8Z	Liberia (Rep of)
A9A-A9Z	Bahrain (State of)
BAA-BZZ	China (People's Rep of)
CBA-CEZ	Chile
CFA-CKZ	Canada
CLA-CMZ	Cuba
CNA-CNZ	Morocco (Kingdom of)
COA-COZ	Cuba
CPA-CPZ	Bolivia (Rep of)
CQA-CUZ	Portugal
CVA-CXS	Uruguay (Oriental Rep of)
CYA-CZZ	Canada
CZA-CZZ	Nauru (Rep of)
C3A-C3Z	Andorra (Principality of)
C4A-C4Z	Cyprus (Rep of)
C5A-C5Z	Gambia (Rep of the)
C6A-C6Z	Bahamas (C'wealth of the)
C7A-C7Z*	World Meteorological Org
C8A-C9Z	Mozambique (People's Rep of)
DAA-DRZ	Germany (Fed Rep of)
DSA-DTZ	Republic of Korea
DUA-DZZ	Philippines (Rep of the)
DZA-DZZ	Angola (People's Rep of)
D4A-D4Z	Cape Verde (Rep of)
D5A-D5Z	Islands (Rep of)
D7A-D7Z	Comoros (Fed & Islamic Rep of the)
D8A-EHZ	Republic of Korea
EAA-EJZ	Spain
EIA-EJZ	Ireland
EKA-EKZ	Union of Soviet Socialist Republics

## Allocation of International Call Signs

Call Sign	Allocated To
AAA-ALZ	United States of America
AMA-AOZ	Spain
AAA-ASZ	Pakistan (Islamic Rep of)
ATA-AWZ	India (Rep of)
AXA-AXZ	Australia
AYA-AZZ	Argentine Republic
AZA-AZZ	Botswana (Rep of)
ASA-ASZ	Tonga (Kingdom of)
AAA-A4Z	Oman (Sultanate of)
AAA-A5Z	Brunei (Kingdom of)
AAA-A6Z	United Arab Emirates
A7A-A7Z	Qatar (State of)
AAA-A8Z	Liberia (Rep of)
AAA-A9Z	Bahrain (State of)
BAA-BZZ	China (People's Rep of)
CAA-CEZ	Chile
CFA-CKZ	Canada
CLA-CMZ	Cuba
CNA-CNZ	Morocco (Kingdom of)
COA-COZ	Cuba
CQA-CPZ	Bolivia (Rep of)
CQA-CUZ	Portugal
CYA-CXS	Uruguay (Oriental Rep)
CYA-CZZ	Canada
CZA-CZZ	Nazareth
C3A-C3Z	Andorra (Principality of)
C4A-C4Z	Cyprus (Rep of)
C5A-C5Z	Gambia (Rep of)
C6A-C6Z	Bahamas ('C'wealth of the)
C7A-C7Z*	World Meteorological Org
C8A-C9Z	Mozambique (People's Rep of)
DAA-DRZ	Germany (Fed Rep of)
DZA-DTZ	Republic of Korea
DUA-DZZ	Philippines (Rep of the)
D2A-D2Z	Angola (People's Rep of)
D4A-D4Z	Cape Verde (Rep of)
D5A-D5Z	Iberria (Rep of)
D6A-D6Z	Comoros (Fed & Islamic Rep of the)
D7A-D7Z	Republic of Korea
D8A-D8Z	Republic of Korea
EAA-EJZ	Ireland
EKA-EKZ	Union of Soviet Socialist Republics



# Australian VHF, UHF and SHF records

Correct as at 1-1-90

Legend: # Australian record # New record since last edition

## 1. Home/Portable Category

### Australian Capital Territory

50 MHz No claim  
144 MHz VK1RH to VK1ZJR 1/03/87 16.3 km

### New South Wales

50 MHz VK2ASZ to VE1ASJ 6/04/81 16,654.4 km  
144 MHz VK2ZRU to VK6AOM 13/12/86 2,697.9 km  
432MHz VK2ZAB to ZL1AKW 13/01/86 2,298.8 km  
576 MHz VK4ZRP/2 to VK4ZSH/4 1/12/81 255.4 km  
2796 MHz VK2BDN to ZL1AVZ 9/12/82 2,132.7 km  
2300 MHz VK2ZAC/2 to VK2BDN/2 19/05/73 159.9 km  
3,300 MHz VK2AHC/2 to VK2SB/2 16/01/77 114.1 km  
5,650 MHz VK2AHC/2 to VK2SB/2ZND/2 12/04/76 114.1 km  
10,000 MHz VK2AHC/2 to VK2SB/2ZND/2 12/04/76 114.1 km

### Victoria

50MHz VK3OT to VP2VGR 17/03/81 16,663.3 km  
144MHz VK3YLR/3 to VK6KZ/6 23/01/80 2,784.4 km  
432MHz \* VK3ZBJ to VK6KZ/6 23/01/80 2,715.9 km  
576MHz \* VK3ZBJ to VK3KAJ/5 25/2/89 382.9 km  
1,296MHz \* VK3ZBJ to VK6GW 18/03/88 2,449.3 km  
2,300MHz VK3ZHP to VK7HL 12/01/85 427.3 km  
3,300MHz VK3KAJ/3 to VK3ZBJ 25/01/86 244.3 km  
5,650MHz No claim  
10,000MHz \* VK3KAJ/3 to VK3ZBJ/3 8/02/86 252.1 km

### Queensland

50MHz VK4AYX to DL3ZM/VV5 18/03/81 15,582 km  
144MHz \* VK4ZSH/4 to JA7OXL 24/04/83 6,619.9 km  
432MHz VK4LC to ZL3JAT 24/1/82 2,283.4 km  
576MHz VK4ZRH/4 to VK4ZSH/4 7/2/81 377.6 km  
1,296MHz AX4QO4 to AX4ZT/2 12/04/70 402 km  
2,300MHz No claim  
3,300MHz No claim  
5,650 MHz No claim  
10,000 MHz VK4ZNC/4 to VK4ZSH/4 9/11/81 170.6 km

### South Australia

50MHz VK5KK to XE1GE 9/04/79 14,078 km  
144MHz VK5ZEE to ZL1JHH 15/01/86 3,458.8 km  
432MHz VK5NY to VK7JG 21/05/85 996.0 km  
576MHz \* VK3KAJ/5 to VK3ZBJ 25/2/89 382.9 km  
1,296MHz \* VK5MC to VK6KZ/6 23/01/80 2,289.4 km  
2,300MHz VK5QR to VK6GW 17/02/78 1,885.5 km  
3,300MHz \* VK5QR to VK6GW 25/01/86 1,885.5 km  
5,650MHz \* VK5NT to VK5ZD/2 12/11/89 176.7 km  
10,000MHz VK5CU/5 to VK5MW/5 12/11/89 95.7 km

### Western Australia

50MHz \* VK6BE to JA8BP 30/10/58 8,833 km  
144MHz VK6KZ/6 to VK3YLR/3 23/01/80 2,784.2 km  
432MHz \* VK6KZ/6 to VK3ZBJ 23/01/80 2,715.9 km  
576MHz VK6KZ/6 to VK6HKK 18/01/83 196.4 km  
1,296MHz \* VK6GW to VK3ZBJ 18/03/88 2,449.3 km  
2,300MHz \* VK6GW to VK5QR 17/02/78 1,885.5 km  
3,300MHz \* VK6GW to VK5QR 25/01/86 1,885.5 km

### Tasmania

50MHz VK7JG to W5FF 17/04/82 13,765 km  
144MHz VK7ZAH to VK4AZ 1/01/87 1,910 km  
432MHz VK7JG to VK5NY 21/05/86 995.0 km  
1,296MHz VK7AH to VK3AKC 17/02/71 439 km  
2,300MHz VK7HL to VK3ZHP 12/01/85 427.3 km

### Northern Territory

50MHz \* VK9GB to 9Y4LL 10/04/82 18,666.4 km  
144MHz VK4ZSH/8 to JA7OXL 24/10/82 6,460.9 km

### 2. EME Category

144MHz VK3JATN to K2MWA/2 28/1/86 18,761 km  
432MHz VK6ZT to K2UYH 29/01/83 18,728.4 km  
1,296MHz VK3AKC to W2NFA 6/10/73 18,713 km

### 3. ATV Category

432MHz VK7EM/T to VK3ZPAT 13/12/72 413 km

### 4. Mobile Category

144MHz VK3KAJ/M to VK6BE 25/1/86 2,224.5 km  
432MHz VK3KAJ/M to VK6BE 25/1/86 2,224.5 km  
576MHz \* VK3KAJ/M to VK3ZBJ 26/2/89 122.5 km  
1,296MHz \* VK3ZJC/M to VK3KWC/M 16/9/89 137.6 km

### 5. Digital Modes Category

52MHz \* VK3ZJC to VK8ZLX 26/12/86 1906.3 km

## Stolen Equipment Register

The Stolen Equipment Register is one of many services offered to members by the Wireless Institute of Australia. It has now been in operation since 1980, and is maintained on a computer database in the Federal Office. At regular intervals, updates of the complete list, sorted into categories of Equipment Manufacturer/Model, Owner, Date Stolen are distributed to each Division. Members wanting to take advantage of this register, either to publish the theft of their equipment, or to check equipment they are about to purchase, may contact their Division, or write or telephone the Executive of the details. For maximum efficiency, these details should include: Manufacturer's name, Model, Type of equipment, Serial number, Date stolen, Owner's name, address and call sign, Any distinguishing features or modifications, Police contact, if any. When equipment is recovered, it is important that you advise the Executive Office as soon as practicable. This list is the most up-to-date information we have at the time of going to press, but is based entirely on information received from you, the member. Would all readers please check this list and immediately advise if there are any amendments required.

Any telephone reports of stolen equipment must be followed immediately with written confirmation of the details. For maximum efficiency, these details should include: Manufacturer's name, Model, Type of equipment, Serial number, Date stolen, Owner's name, address and call sign, Any distinguishing features or modifications, Police contact, if any. When equipment is recovered, it is important that you advise the Executive Office as soon as practicable. This list is the most up-to-date information we have at the time of going to press, but is based entirely on information received from you, the member. Would all readers please check this list and immediately advise if there are any amendments required.

## WIA DATABASE LIST OF UNRECOVERED STOLEN EQUIPMENT AS AT 6 Jan 1990

*Manufacturer	Description	Serial No	Owner	Stolen	Recovered	Published Comment
AZDEN	PCS-3000	2M FM MOBILE	VK2KCV	01-Jan-87	-	NO MICROPHONE - NO BRACKET
DK K SMITH	AUDIO	GENERATOR	VK2KJC	15-May-85	01-Aug-85	-
DIK K SMITH	EXPLORER	70CM FM TRANSCIEVER	VK2KUR	24-Sep-84	01-Jan-85	EXTENSIVE MODIFICATIONS
DRESSLER	EVV2000	2M PRE AMP	VK2KJC	15-May-85	01-Aug-85	-
ELECTROPHONE	TX47GT	UHF TRANSCIEVER	VK6ZPL	11-Apr-87	-	-
ELTRONICS	NOISE BRIDGE	EM342	VK4AAE	27-Oct-89	-	-
GALAXY	5	587V2118	VK3JUB	06-Jun-87	-	REMOTE VFO
GALAXY	5	550GV1309	VK3JUB	06-Jun-87	-	REMOTE VFO
ICOM	IC20A	2M FM HANDHELD	VK2FZH	09-Jun-89	01-Aug-89	WITH BP3 AND BC25E
ICOM	IC202		VK3ZBJ	01-Oct-85	01-Mar-87	-
ICOM	IC202		VK3ZJY	11-Aug-87	01-Oct-87	-
ICOM	IC202		VK4ZSH	03-Sep-85	01-Nov-85	-
ICOM	IC211	2M M/MODE T/CIEVER	VK3BRV	17-Oct-84	01-Jan-85	-
ICOM	IC215	2M FM PORT T/CIEVER	VK2AMX	20-Nov-84	01-Mar-85	-
ICOM	IC22		VK3BLC	29-Apr-85	01-Jul-86	-
ICOM	IC22A		VK2ZG	01-Jul-87	-	-
ICOM	IC22A		VK4ZSH	03-Sep-85	01-Nov-85	-
ICOM	IC22A		VK3ZU	03-May-84	01-Jul-84	-
ICOM	IC22A	2M FM TRANSCIEVER	FALLEN OFF VK3YV	21-Aug-87	-	EARLY MODEL 22 CHANNELS
ICOM	IC22S		VK3KAW	23-Dec-85	01-Mar-87	-
ICOM	IC22S	2M TRANSCIEVER	VK2ETJ	06-Mar-88	-	PRE AMP, SOCKET
ICOM	IC22S		VK3ME	14-Aug-85	01-Nov-85	-
ICOM	IC22S	2M FM TRANSCIEVER	VK6ZIB	11-Feb-89	-	-
ICOM	IC22S		VK3ZJY	11-Sep-84	01-Nov-84	-
ICOM	IC22S	VHF FM TRANSCIEVER	VK2KJA	14-Dec-87	-	DIGITAL READOUT
ICOM	IC25A	2M FM TRANSCIEVER	VK2DPM	04-Nov-84	01-Jan-85	VFO MODIFIED
ICOM	IC280	TRANSCIEVER	VK2BVV	30-Mar-88	-	-
ICOM	IC290H		VK3ZBI	01-Oct-85	01-Mar-87	-
ICOM	IC290H		ELTRONICS	17-Feb-86	01-Mar-86	-
ICOM	IC2A		VK3YOD	02-Dec-83	01-Jul-84	SPARE BATTERY PACK

Manufacturer	Model	Description	Serial No	Owner	Stolen	Recovered	Published Comment
ICOM	IC2A		12309700	VK2AHF	06-Sep-87	-	-
ICOM	IC2A	144 MHZ FM H/HELD	12213837	VK5ABY	22-Dec-88	01-Mar-89	-
ICOM	IC2A	2M H/HELD TC/CEIVER	29901052	VK2CKD	05-Feb-86	01-Apr-86	-
ICOM	IC2A	2M FM HANDHELD	04484	VK1MX	21-Jan-85	01-Apr-85	VINYL CASE
ICOM	IC3200		01046	VK2CIM	02-Aug-87	-	-
ICOM	IC45A	70CM FM TRANSCEIVER	01876	VK2DPM	04-Nov-84	01-Jan-85	-
ICOM	IC45A		18351005	VK2KJC	22-Feb-84	01-Jul-84	MEMORY BACKUP UNIT
ICOM	IC490A	70 CM TRANSCEIVER	16101192	VK3BVO	01-Mar-83	01-Jul-84	-
ICOM	IC4E		18103021	VK3VZD	02-Dec-83	01-Jul-84	SPARE BATTERY PACK
ICOM	IC4E			VK3ZJY	16-Aug-87	-	CALLSIGN ENGRAVED
ICOM	IC502		00618	VK3ZJY	11-Aug-87	01-Oct-87	-
ICOM	IC551		01273	VK4ZSH	03-Sep-85	01-Nov-85	INCLUDING FM, VOX
ICOM	IC551		9401253	VK3ZBI	01-Oct-85	01-Mar-87	-
ICOM	IC551D	6M TRANSCEIVER	99003378	VK3VSG	01-Jan-84	01-Jul-84	-
ICOM	IC701	TRANSCEIVER	8001039	VK2???	15-Feb-88	-	-
ICOM	IC701PS	POWER SUPPLY	7800978	VK2???	15-Feb-88	-	-
ICOM	IC720A		06242	VK4ZSH	03-Sep-85	01-Nov-85	-
ICOM	IC730		13806798	MELB UNIV	18-Sep-85	01-Nov-85	HOME BREW POWER SUPPLY
ICOM	IC735		36304465	EMTRONICS	17-Feb-86	01-Mar-86	-
ICOM	ICP520	POWER SUPPLY	10101966	VK3VSG	01-Jan-84	01-Jul-84	-
KDK	2025 MK II	2M TRANSCEIVER		VK2ETJ	06-Mar-88	-	DEFUNCT FINAL
KDK	FM2025 MK	2 2M FM TRANSCEIVER	A5020	VK2AML	03-Jul-88	-	SHARPE MICROPHONE
KDK	MULTI 7	2M HANDHELD		VK2TJB	09-Feb-88	-	DRIVERS LICENCE ENGRAVED
KENWOOD	AT180	ANTENNA TUNER	0020450	VK2???	11-Nov-87	-	-
KENWOOD	AT200	ANTENNA TUNER	820049	VK2DCB	16-Aug-84	01-Nov-84	-
KENWOOD	DG5	DIGITAL DISPLAY	730475	VK2DCB	16-Aug-84	01-Nov-84	-
KENWOOD	DM81	GRID DIP OSCILLATOR	4200163	VK2KLF	10-Aug-89	-	STENCILLED IN 20MM BRIGHT YELLOW
KENWOOD	MC-50	DESK MICROPHONE	N/A	VK5ABY	22-Dec-88	-	-
KENWOOD	MS1	MOBILE MOUNT		VK5BJA	30-May-89	-	-
KENWOOD	SP520	SPEAKER		VK2DCB	16-Aug-84	01-Nov-84	-
KENWOOD	TM221A	2M FM TRANSCEIVER	8110722	VK2CCD	09-Apr-88	-	-
KENWOOD	TM221A		8022541	VK3ZJY	11-Aug-87	01-Oct-87	-
KENWOOD	TR2400	2M FM HANDHELD	0061926	VK2PJ	20-Apr-85	01-Jul-85	CALLSIGN ENGRAVED
KENWOOD	TR2400		0061950	VK2DPM	28-Aug-84	01-Nov-84	-
KENWOOD	TR2500		3040009	VK2ZQC	29-May-85	01-Aug-85	MICROPHONE AND CHARGER
KENWOOD	TR2500		3033045	VK2DYW	18-Feb-87	-	-
KENWOOD	TR2600A	2 M HANDHELD	5060895	VK5BJA	30-May-89	01-Jul-89	INCLUDING RUBBER DUCK ANTENNA
KENWOOD	TR2600A	HANDHELD	7030631	VK5AAR	03-Oct-86	01-Mar-87	-
KENWOOD	TR2600A	2 M HANDHELD TC/VER	5060894	VK2KLF	10-Aug-89	-	MISSING HAND STRAP
KENWOOD	TR7550	2M FM TRANSCEIVER	1111125	VK2CCK	07-Feb-86	01-Apr-86	-
KENWOOD	TR7550		202080	VK2DED	06-Mar-84	01-Mar-87	"N" CONNECTOR
KENWOOD	TR7550	2M FM H/HELD TC/CEIVER	2020861	VK2ALK	22-Oct-88	01-Jan-89	-
KENWOOD	TR7950		4010747	VK2TVG	08-Aug-85	01-Nov-85	-
KENWOOD	TR9000	2M TRANSCEIVER	1050780	VK3VSG	01-Jan-84	01-Jul-84	-
KENWOOD	TR9000		1020527	VK2KAW	03-Jan-87	01-Mar-87	ADDITIONAL MEMORY SWITCH
KENWOOD	TS1205	TRANSCEIVER	950819	VK2???	11-Nov-87	-	-
KENWOOD	TS120V		0061224600	VK3VWN	03-May-88	01-Jul-85	MT35 MICROPHONE
KENWOOD	TS130S	TRANSCEIVER	4040128	VK2BVW	30-Mar-88	-	-
KENWOOD	TS130S	HF SSB TRANSCEIVER	1090168	VK5ABY	22-Dec-88	01-Mar-89	-
KENWOOD	TS130SE		2060697	VK2KAW	03-Jan-87	01-Mar-87	-
KENWOOD	TS430S		4010322	VK2KJC	15-May-85	01-Aug-85	INCLUDING FM, FILTER
KENWOOD	TS440S	HF TRANSCEIVER	7909271	VK2FIT	24-Oct-89	-	WITH PS50 PSU & MC85 DESK MIC
KENWOOD	TS520S		820972	VK2DCB	16-Aug-84	01-Nov-84	-
KENWOOD	TS620S	HF TRANSCEIVER	?	VK2PZH	09-Jun-89	01-Aug-89	STICKER FROM "TURKEY RADIO"
KENWOOD	TS700A		3650409	VK3ZJY	11-Aug-87	01-Oct-87	-
KENWOOD	TS930S		3050176	VK3ZJY	13-Jan-83	01-Jul-84	-
KENWOOD	VFO320	EXTERNAL VFO		VK2DCB	16-Aug-84	01-Nov-84	-
KENWOOD	TM144-10	2M FM TRANSCEIVER	5027	VK2KUR	24-Sep-84	01-Jan-85	CALLSIGN ENGRAVED
LEADER	LG811	SIGNAL GENERATOR	0041244	VK3KJA	14-Dec-87	-	-
LEADER	LG816	SIGNAL GENERATOR	1081098	VK3VSG	01-Jan-84	01-Jul-84	MISC BITS ALSO
MIRAGE	B1016	2M 160W PWR AMP	550779	VK3KAW	23-Dec-85	01-Mar-87	-
REALISTIC	AX190	HF RECEIVER	500111	VK3KJA	14-Dec-87	-	-
REALISTIC	SP190	SPEAKER ENCLOSURE	20-5191	VK3KJA	14-Dec-87	-	-
REGENCY	HX2000	HANDHELD		DSE VIC	13-May-85	01-Aug-85	-
SAIKO	SC7000	SCANNER		VK2KJC	15-May-85	01-Aug-85	BNC ANTENNA SOCKET
SONY	2001D	COMMUNICATIONS RECVR		VK2PZH	09-Jun-89	01-Aug-89	BROKEN ANTENNA
TELEQUIP	651	OSCILLOSCOPE		VK4AAE	27-Oct-89	-	-
TELEQUIP	15	2M HANDHELD	012240	VK3ZJY	06-Jun-87	-	-
THORN	B&W TV		107512	VK2KJC	15-May-85	01-Aug-85	MOD FOR COMPUTER
TOKYO	HL160V	2M POWER AMPLIFIER	829331	VK2KJC	15-May-85	01-Aug-85	-
TOKYO	HL86V	6M POWER AMPLIFIER	819586	VK2KJC	15-May-85	01-Aug-85	-
TOKYO	HL90U	70CM POWER AMP	8304246	VK2KJC	15-May-85	01-Aug-85	-
TRIO	CS1560A2	CRO	10-20171	VK3VSG	01-Jan-84	01-Jul-84	-
UNDEN	2020		50806009	VK2KSY	16-Sep-85	01-Nov-85	-
WELZ	SP200	SWR/PWR METER	600384	VK2KJC	15-May-85	01-Aug-85	-
YAESU	FAS14R	REMOTE ANT SEL	141138	VK3KJA	14-Dec-87	-	-
YAESU	FC707	ANTENNA TUNER	11040765	VK3DHY	01-Jun-87	-	-
YAESU	FC707	ANTENNA TUNER	11140715	VK2DBE	28-Apr-86	01-Jul-86	-
YAESU	FC707	ANTENNA TUNER	11802655	VK4AAE	27-Oct-89	-	-
YAESU	FL2010	2M LINEAR AMPLIFIER	11031300	VK3DKO	25-Aug-88	-	MOUNTED IN CRADLE
YAESU	FP707	12V 20 AMP PSU/SUPPLY	11H120548	VK5ABY	22-Dec-88	01-Mar-89	-
YAESU	FP707	POWER SUPPLY	4C050487	VK4AAE	27-Oct-89	-	-
YAESU	FRA7700	ACTIVE ANTENNA	2H050292	VK2???	11-Nov-87	-	-
YAESU	FRG7		299L26099	VK3ZLY	28-Jul-83	01-Jul-84	-
YAESU	FRG7700	RECEIVER	3M260993	VK2XPJ	01-Aug-89	-	-
YAESU	FRG7700	RECEIVER	2K210752	VK2???	11-Nov-87	-	-

YAESU	FT17700	ANTENNA TUNER	2K070479	VK2777	11 Nov-87	-	-
YAESU	FT101B	HF TRANSCEIVER	83L102373	VK3RJA	14-Dec-87	-	-
YAESU	FT101B	HF TRANSCEIVER	83CS0283	VK2SS	29-Jun-84	01-Nov-84	-
YAESU	FT101E	HF TRANSCEIVER	7K301042	VK5EZ	08-Jul-89	01-Sep-89	-
YAESU	FT101E	HF TRANSCEIVER	8L370414	VK3DYZ	11-Sep-84	01-Sep-84	-
YAESU	FT107M	HF TRANSCEIVER	11110012	VK2ALN	03-Mar-87	-	-
YAESU	FT200	HF TRANSCEIVER	2K332322	VK3DYZ	11-Sep-84	01-Nov-84	-
YAESU	FT207R	2M HANDHELD	1D132704	VK2ETJ	06-Mar-88	-	-
YAESU	FT207R	2M FM HANDHELD	10132725	VK2EMC	04-Mar-85	01-May-85	BATTERY COVER MISSING
YAESU	FT208R	2M FM HANDHELD	4E283078	VK2PJ	29-Mar-89	01-Jun-89	FAULTY VCO
YAESU	FT208R		3N350964	VK3CBA	30-Jul-85	01-Mar-87	-
YAESU	FT209R		4L062345	DSE VIC	13-May-85	01-Aug-85	-
YAESU	FT209RH		4K050638	VK3CE	01-Jan-85	01-Mar-85	BLUE VINYL CASE
YAESU	FT209RH		5K190401	VK21HW	21-Feb-86	01-May-86	LEATHER CASE
YAESU	FT224		6G307290	VK3OV	28-May-87	-	-
YAESU	FT230			VK2EQD	18-Aug-87	-	-
YAESU	FT230R		4H081794	DSE VIC	13-May-85	01-Aug-85	-
YAESU	FT230R	2M FM TRANSCEIVER	2D100942	VK3DKO	25-Aug-88	-	CALLSIGN ENGRAVED
YAESU	FT230R	2M TRANSCEIVER	3C260713	VK2EGD	12-Nov-86	01-Feb-87	-
YAESU	FT230R	2M TRANSCEIVER	1L081321	VK3JC	22-Feb-84	01-Jul-84	-
YAESU	FT230R	2M TRANSCEIVER	1M081340	VK2VE	04-Jan-87	01-Mar-87	-
YAESU	FT230R	2M TRANSCEIVER	5G450016	VK71HW	18-Apr-88	-	-
YAESU	FT230R		4E360554	VK3RGH	01-Jun-85	01-Aug-85	OWNERS NAME
YAESU	FT230R	2M TRANSCEIVER	SF 280702	VK4AAE	27-Oct-89	-	MOBILE BRACKET
YAESU	FT480R		1H12069	VK1ZUR	29-May-84	01-Jul-84	VINYL CASE
YAESU	FT620		010488	VK4ZSH	03-Sep-85	01-Nov-85	COMPLETE WITH NICADS

## VIDEOTAPE LIBRARY

Now every Radio Club can provide their members with quality technical lectures on subjects covering the whole range of Amateur Radio activities by taking advantage of the WIA Federal Videotape Library. You'll find this a boon, particularly if you're a country club which often has difficulty obtaining a variety of expert lecturers for its regular meetings. Individual Amateurs and Librarians should take note of the Duplication Fees at the end of this.

For Radio Clubs affiliated with the WIA it's inexpensive and easy.

Here's how it works.

For those titles for which the WIA does NOT hold a copy-right licence, all you have to do is:

Supply the Videotape Co-ordinator with a video-cassette in a Video Cassette Box "Postpak", and Enclose Address and Stamps for return postage and the program is free for you to use in support of Amateur Radio in your area including copying and transmission over the air if you wish.

Those programs which are copyright marked 'c' below, are available only ON LOAN.

To obtain any of them send with your request:

Information about your preferred VCR format.

A statement signed by a Responsible Officer of your Club that 'I undertake that while (Program Title) is assigned to me, I will not allow it to be transmitted over the air, nor copied by any means whatsoever, and that I will return the same promptly

after showing."

Enclose Address and Stamps for postage to you. The present "available formats" are as follows:-

VHS - Size 200 x 110 x 30mm, Mass 350gr

\* Standard Play 4Hr max, or Long Play 8Hr max as requested.

\* Standard Sound - "Dolby" On or Off as requested

"Hi-Fi" FM Sound also present on all VHS cassettes. BETA - Size 180 x 100 x 30mm, Mass 300gr

Standard Play 3Hr 15min max only.

Standard Sound only (No "Dolby").

VIDEO 8 - Size 103 x 68 x 20mm, Mass 80gr

\* Standard Play 1 1/2Hr max, or Long Play 3Hr max as requested

"Hi-Fi" FM Sound is Standard (No "Dolby").

Obviously the smaller and lighter the cassette, the less the postage. \* Note: Be sure to request Standard or Long Play, "Dolby" On or Off.

NOTE TO INDIVIDUAL AMATEURS: Since the inception of the WIA Federal Video Service, cassettes have been made freely available to all comers, especially to isolated Amateurs. However, recently there has been a rapid rise in the number of requests from individual Amateurs, some asking for over 10 hours of programs at a time.

Video duplication is a real-time, one-at-a-time operation for which the costs of maintenance of the equipment is not small. Obviously the Service is much more economical if (say) one tape is seen by 30

members of a club than if each of the 30 members were to request their own personal copy. Indeed, if EVERY member of the WIA requested just ONE program it would take about 4 YEARS at 40 hours a week to service!

So in an effort to encourage requests from Groups of Amateurs rather than individuals, from now on a Duplication Fee of \$2 per hour or part thereof will be payable in advance for all requests from Individual Amateurs. All such Fees will go towards upkeep of the duplication equipment.

NOTE TO LIBRARIANS: A number of Educational Institutions have already availed themselves of the technical lecture tapes from the WIA. While this service will continue to be available, from now on a Duplication Fee of \$10 per hour or part thereof will be payable in advance by all Institutions not affiliated with the WIA. All such Fees will go towards the production costs of future Technical Lectures.

NOTE RE TAPE CASSETTE QUALITY. The WIA Videotape Co-ordinator retains the right to refuse to copy onto inferior quality video tape. In the past such tape has caused many hours of wasted time through clogged heads, and in future only reputable brands of video tape will be accepted. In particular, although not always in itself a guarantee of quality, use only those VHS cassettes which carry the official "VHS" logo.

## WIA VIDEOTAPE PROGRAM TITLE LISTING as of 1/1/90

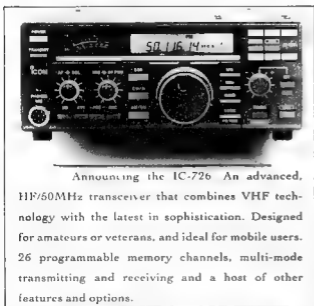
See Note	TITLE (in chronological order within each subject grouping)	Lecturer	Prod.	Approx Dur.	Col/ B&W	Year Prod	Description and/or Other Information	
	<b>AMATEUR RADIO - HISTORIC INTEREST</b>							
c	Wireless Telegraphy - circa 1910		?	10mins	B&W	1910	Archive material courtesy David Wardlaw	
e	Amateur Radio (TV Pilot Program)		VK3ADW	30mins	B&W	1968	Archive material courtesy TEN channel 10	
.	Opening of Burley Griffin Bldg - SA HQ		WIA NSW	50mins	Colour	1977	Archive material	
.	ATV in Australia 1978 - made for British ATV Club		VK5KG	30mins	Colour	1978	Archive material	
.	ATV in United Kingdom 1978 - reply from BATC		G8CJS	30mins	Colour	1978	Archive material	
.	History of ATV in South Australia		VK5KG	30mins	Colour	1980	Archive material, still building	
.	Opening of Amateur Radio House - NSW HQ		VK2BDN & VK2ZQC	1' 42"	Colour	1983	Archive material	
.	VK2 75th Aniv Seminar Keynote Speeches		WIA NSW	2' 15"	Colour	1983	Dr David Wardlaw & State Manager DOC	
c	Heard Island Expeditions		ch 2,7,9,10	20mins	Colour	1984	Archive material, NO LOAN OR COPY AVAILABLE	
e	Heard Island Expedition		VK2BCC	WIA NSW	60mins	Colour	1986	Raw Unedited, from 1986 VK2 Seminar
	<b>AMATEUR RADIO - PROMOTIONAL</b>							
o	The Ham's Wide World		ARRL	27mins	Colour	1969	Superseded by "The World of Amateur Radio"	
.	This is Amateur Radio		ARRL	15mins	Colour	1970	Pitched at teenagers	
.	Moving Up to Amateur Radio		ARRL	11mins	Colour	1975	Pitched at CBers	
c	7.1RL DXpedition		ARRL	60mins	Colour	1976	General Amateur Radio interest, LOAN ONLY	
.	This Week has 7 Days looks into Amateur Radio		HSV7	25mins	Colour	1978	Pitched at teens, includes some ARRL footage	
o	The World of Amateur Radio		ARRL	28mins	Colour	1978	Superseded by "The New World of Amateur Radio"	
.	Amateur Radio - The National Resource of Every Nation		VK5KG	6mins	Colour	1979	Encapsulates AR, good for public exhibitions	

# THE GEORGE BUSH, MA MIKHAIL GORBACHEV

What has made Icom's range of transceivers world leaders in their class? Could it be the uncompromising standards of a George Bush? Is it the durability of a Maggie (Iron Lady) Thatcher? Or the innovative thinking of a Mikhail Gorbachev?

It is, in fact, a combination of all three.

Which has led millions of radio users around the world to choose Icom. Their vote has made Icom the world leader of transceivers.



Announcing the IC-726 An advanced, HF/50MHz transceiver that combines VHF technology with the latest in sophistication. Designed for amateurs or veterans, and ideal for mobile users. 26 programmable memory channels, multi-mode transmitting and receiving and a host of other features and options.



The Icom IC-765 HF transceiver features DDS synthesiser, high speed auto tuner, built-in AC power supply, 99 programmable memories, keyboard frequency entry, band stacking register, general coverage receiver 100KHz-30MHz, CI-V system for PC control and rack mounting dimensions

The Icom IC-32AT dual band FM transceiver outputs 5.5W and has a full duplex crossband operation, on/off switchable power saver and 20 double-spaced memory channels that can store two frequencies. The programmed scan function scans all frequencies between two programmable frequencies. And Priority Watch monitors the Call Channel, a memory channel or all the memory channels in succession, every five seconds.



The Icom IC-228A (25W) and IC-228H (45W) mobile FM 144MHz transceivers are compact and easy to operate with 20 memory channels, multi-colour LCD programmed and memory scans, variable tuning steps, priority watch, main controls lit for night operation.

# RGARET THATCHER AND V OF TRANSCEIVERS.



The Icom IC-475A (25W) and IC-475H (75W) 430 MHz All Mode transceivers are designed for packet mode with direct digital synthesizer (DDS), 99 memory channels, USB, LSB, CW, FM, passband tuning and adjustable IF notch filter.



The Icom IC-575A (10W) and IC-575H (100W) 28/50 MHz All Mode transceivers have a receiver coverage of 26-56 MHz and are equipped with direct digital synthesizer (DDS), 99 memory channels, and passband tuning.

The ICOM IC-4SA an amazing 70cm midget hand held Comprising 48 memories plus 1 call channel, operating from batteries with 5 watts output at 13.8v

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See TITLE (in chronological order Note within each subject grouping)	Lecturers	Prod.	Approx Hrs	Co/L B&W	Year Prod	Description and/or Other Information
- The New World of Amateur Radio		ARRL	28mins	Colour	1988	Supersedes "The World of Amateur Radio"
<b>ANTENNAS</b>						
- 60C's Aerial Circus		G6CJ WIA	90mins	B&W	1977	THE Definitive Antenna Lecture. LOAN ONLY
- Wire Antennas		VK5RG VK5KG	40mins	B&W	1978	Antennas for HF and Antenna Tuners
- Loaded Wire Antennas		VK5NN VK5KG	50mins	Colour	1980	Using Inductive and Capacity loaded Antennas
- Antennas and Directivity		VK2BBF OTC	73mins	Colour	1985	Lecture given to a group of Radio Amateurs
- Antenna Rotator Systems		VK5AIM VK5KG	50mins	Colour	1986	Servicing the several different types
- Broadband Antennas		VK5RG VK5KG	62mins	Colour	1986	Includes terminated antennas
<b>ATV - ACTIVITY</b>						
- ATV in Australia 1980/81 - Made for British ATV Club		VK5KG	60mins	Colour	1980	Chips from ATV Groups in VKs 2,3,4,5 & 7
- ATV in United Kingdom 1978/81		G8CJS	30mins	Colour	1981	Remake of their previous effort
- CQ ATV DX International 1983		WB2LLB	10mins	Colour	1983	ATV in USA and Europe
- ATV in Victoria, 1984		VK3AHJ	10mins	Colour	1984	Courtesy of "The Roadshow Gang"
- Hello from America! Made for British ATV Club		WB0QCD	10mins	Colour	1988	Chips from ATV Groups in the USA
<b>ATV - GENERAL INTEREST</b>						
- Low Definition Television	Chris Long	VK5KG	25mins	Colour	1982	Re-creation of TV as transmitted by Baird
- Model Aero-Nautical Mobile ATV		VK5GO VK5KG	6mins	Colour	1983	ATV camera & TX mounted in a model aeroplane
- VK5RCN - Aust's first wind powered ATV rpt		VK5KAU VK5KG	61mins	Colour	1986	A tour in and around
- Australian TV History - The Untold Story	Chris Long	VK5KG	56mins	Colour	1988	Lecture to Radio Amateurs Old Timers Club
- Australian TV History - Part 2	Chris Long	VK5KG	49mins	Colour	1988	Technical slides not used in the above
NEW The Development of the TV Test Card	George Hersee	GRPTH	83mins	Colour	1988	Made for BATC by the BBC Training Dept
<b>ATV - TECHNICAL</b>						
- The Signal to Noise Story		VK3ATY VK3AHJ	45mins	Colour	1982	Superseded by "UHF Pre-amplifiers" (below)
- UHF Preamplifiers		VK3ATY VK3AHJ	45mins	Colour	1983	Explanation and demo of low noise preamps
- Getting Started in Amateur Television		VK5KTV VK5KG	55mins	Colour	1983	How to set up an ATV station
- Testing ATV Transmitters		VK5KG VK5KG	10mins	Colour	1983	How to correctly measure ATV systems
- High Definition TV Tutorial	Don Fink	WYTHLH	10mins	B&W	1983	A look at what is to come in Broadcast TV
- * ATV Hamfest, York Pennsylvania, Sept '83	Various	WB2LLB	6hrs	Colour	1983	Various ATV technical lectures from USA
<b>COMPUTERS</b>						
- Demo of VK5RTV's Micro-Computer Controller #1		VK5KG VK5KG	10mins	Colour	1979	First u-Computer controlled repeater in VK
- Understanding Micro-Processors		VK5PE VK5KG	10mins	Colour	1980	A somewhat dated technical description
- An ATV Hamshack Micro-Computer		VK3AHJ VK3AHJ	10mins	Colour	1981	Describes now unavailable microcomputer kit
- Getting Started in Amateur Micro-Computers		VK5IF VK5KG	33mins	Colour	1983	Demo. of hard- & software for Amateur Radio
<b>DATA TRANSMISSION</b>						
- Getting Started in Amateur RTTY		VK5JM VK5KG	10mins	Colour	1983	RTTY using teleprinters and Micro-Computers
- Amateur Packet Radio		VK5AGR VK5KG	10mins	Colour	1984	Theory and Demonstration
- Packet Radio - 10 months on		VK2KYJ & VK2AAB	10mins	Colour	1985	Raw Unedited, from 75 min. VK2 Seminar
- X25 Protocols and Packet Switching		WIA NSW	47mins	Colour	1986	Lecture given to a group of Radio Amateurs
<b>MICROWAVE TECHNIQUES</b>						
NEW Introducing Microwaves	Des Clift	VK5ZO PJ Video	74mins	Colour	1988	"Nuts & Bolts" expert technical lecture
<b>PROPAGATION</b>						
- Getting Started in Understanding the Ionosphere		VK5NX VK5ZBD	50mins	Colour	1983	How the Ionosphere aids HF communication
- VHF Signal Enhancement by Aircraft		VK2ZAB WIA NSW	10mins	Colour	1986	Raw Unedited, from 1986 VK2 Seminar
<b>SATELLITES</b>						
- Getting Started in Amateur Satellites		VK5HI & VK5AGR	10mins	Colour	1983	Superseded (see below)
- An Introduction to Amateur Satellites (Pt 1)		VK5AGR VK5KG	10mins	Colour	1984	An overview of Amateur Satellite working
- Micro-Computer Aids to Satellite Tracking (Pt 2) *		VK5KG	30mins	Colour	1984	Programs for tracking & decoding telemetry
- Using Phase III Amateur Satellites		VK5HI VK5KG	10mins	Colour	1984	History, construction & use of high orbit sats.
- The Amatec Oscar Phase 3 Story	Dr. Karl Meinzer	DM42C VK5KG	10mins	Colour	1985	"The Father of Oscar" includes film of launch.
- Antennas for Satellites	Dr. Trevor Bird	WIA NSW	75mins	Colour	1986	Raw Unedited, from 1986 VK2 Seminar
<b>SPACE JOURNALISM INTEREST</b>						
- Apollo 13 Disaster		VK5JM VK5KG	90mins	Colour	1980	Australian tracking procedure saved Apollo 13
- SSTV Pictures from Space - Voyager		VK5RG	15mins	Colour	1983	SSTV pix converted from Saturn fly past
- Ausstat - Australia's Domestic Comm. Satellite		VK5JM VK5KG	62mins	Colour	1984	Technical description of services offered
- Amateur Radio's Newest Frontier	ARRL	26mins	Colour	1985	Amateur Radio in Space, General P.R.	
- Working W5LFL in orbit from VK1ORR	Richard Elliot	23mins	Colour	1986	Raw Unedited actuality footage	
<b>MISCELLANEOUS</b>						
- An Auxiliary Battery Charger		VK5NX VK5KG	10mins	Colour	1981	Charging a second mobile battery
- Lecture - Winning Foxhunts		VK5TV VK5KG	10mins	Colour	1981	How to do it from one who has!
- Getting Started in Amateur Construction		VK5AIM VK5KG	50mins	Colour	1983	Mechanical hints for novice constructors
- Comm. Consequences of Nuclear War	Dr. John Coulter	VK5ZBD	60mins	Colour	1983	Why your gear may not survive even if you do!
- The Far Eastern Broadcasting Company		VK5KG	10mins	Colour	1984	How a Short Wave Broadcaster operates
- The Aust. "Over the Horizon Radar"	Dr. Phil Whittham	VK5KG	60mins	Colour	1984	How the "Australia Woodpecker" works
- What to Expect when the RI Calls!	Geoff Carter	DOC VK5KG	34mins	Colour	1984	Geoff is a Dept of Comm. Field Officer
- Doppler Direction Finding for Foxhunters		VK2BYW WIA NSW	43mins	Colour	1985	Raw Unedited, from 75 min. VK2 Seminar
- Fitting BNC Connectors		OTC	7mins	Colour	1985	Correct Assembly of Crimp type BNC plugs
- Handling Static Sensitive P.C.B.s.	Paul Tardent	OTC	6mins	Colour	1986	Improving reliability of Printed Cts.
- Extra Loose Grades		VK2ZTB WIA NSW	70mins	Colour	1986	Raw Unedited, from 1986 VK2 Seminar
- Thick Film Modules		VK5DI VK5KG	45mins	Colour	1988	Descr. of mod. av. available from VK5 WIA
NEW Quartz Crystals	Clem Tibbrook	VK5GL VK5GL	106mins	Colour	1988	"Nuts & Bolts" expert technical lecture

NOTE: \* = Copyright, no copy service.

w = available ONLY to Radio Clubs Affiliated with the WIA as per agreement with OTC

\* = Optically Converted to PAL from NTSC by

WB2LLB, noticeable flicker  
o = program now out of date

Standard Formats: "Beta", "Video-5" St & L Play, "VHS" St & L Play, "Dolby" and "Hi-Fi" sound - please specify when ordering

# WIA VIDEOTAPE NEW PROGRAM TITLE LISTING as of 1/1/90

See TITLE (in chronological order Note within each subject grouping)	Lecturer	Prod.	Approx Dur.	Col/ B&W	Year Prod	Description and/or Other Information
<b>MICROWAVE TECHNIQUES</b>						
n Introducing Microwaves	Des Clift	VK520 PJ Vid	74mins	Colour	1988	"Nuts & Bolts" expert technical lecture
<b>AMATEUR TELEVISION: GENERAL INTEREST</b>						
n The Development of the TV Test Card	George Hersee	GBPTH	43mins	Colour	1988	Made for BATC by the BBC Training Dept
<b>MISCELLANEOUS</b>						
n Quartz Crystals	Clem Tibbrook	VK6GL VK5GL	106mm	Colour	1988	"Nuts & Bolts" expert technical lecture
n = New Addition      Standard Formats: Beta; Video 8 St & L Play; VHS St & L Play, "Dolby" and "Hi Fi" sound - please specify when ordering.						

## VHF/UHF AN EXPANDING WORLD

ERIC JAMIESON VK5LP  
9 WEST TERRACE MININGIE 5264

All times are Universal Time Co-ordinated and indicated UTC

## Amateur Bands Beacons

In accordance with current practice only changes to the beacon list appear this month. New listings are:

50.062	KH6HME	Hawaii
50.066	AL7C	Alaska
50.074	KH6HI	Hawaii

## Return To The Fold

After a stay in hospital of almost eighteen weeks I was fortunate to be allowed home on the Saturday before Christmas and what a welcome sight it was after such a long absence. For all who have enquired and those who are interested, I am pleased to report that the third operation on my back appears to have been a success. With continuing exercises and physiotherapy a reasonable degree of walking should be possible although it may take twelve months to achieve. However, I have always been known as a fighter so while there is life there is hope! Many thanks for your cards and phone messages.

For several months these notes have been prepared under extremely difficult circumstances culminating in no notes for January due to an operation being scheduled at the time. I thank readers and the Editor of AR for understanding the position.

## The Higginbotham Award

My stay in hospital was considerably brightened one day when I received notification that the 1989 Higginbotham Award was to be mine.

I am indebted to the Selection Committee for the bestowal upon me of this award. It is the second time I have received it, the first being in 1976.

While I have always believed in the worth of amateur radio and the VHF and UHF bands in particular, I have never aimed for such recognition; I have always believed there was a task to be fulfilled and tried to do that to the best of my ability. That my efforts have been recognised is an unexpected bonus — thank you.

## Six Metres

During December six metres has been much as expected. There have been some very good Es openings around the country but they have not been sustained as one expects during periods other than the peak of the sunspot cycle. That this situation exists now is amply demonstrated by the very sporadic nature (no pun intended) of band openings between Christmas and New Year.

Nevertheless, there have been some good contacts to YJ8, FK3D2 and ZL via Es and some of these have extended as far as VK5 ZLs and VK7s were noted around 0200 on 28/12, later at 0813 Garry VK5ZK worked YJ8GP; then many hours of VK4 to VK5 and other States on 29/12; on 30/12 it was the turn of VK6AOM from Esperance and others from Perth, to VK1, 2, 4, 5 and 8. During the morning of 31/12 VK2AAC was observed working VK9NS whose signal extended into VK5. Many other VK2s were noted, also VK1RK.

However, we cannot match the Northern Hemisphere where it has been noted the JAs have been working to KL7, W and VE7.

According to Bill Tynan's "The World Above 50 MHz" in January 1990 QST, September 1989 brought scattered openings, but between 13 and 16 October there were notable openings, producing long path contacts to Japan and covering an area from Virginia to Oklahoma. Stations further south and to the east made many JA contacts. VP5D running 10 watts worked more than 100 JAs! The long path propagation for the first time extended to Hawaii and six metre operators there obtained their first European contacts. KH6HI reported that beginning at 0800 on 14/10 he worked 5B4AZ, ZC4MK, SV1DH, SV1AB, SV1OE and eight 9H1 stations. Bert said the

5B4CY beacon was still in when he closed at 1100. Several other KH6s were included, which resulted in WAC for some. No KH6 had previously been able to qualify for this award.

On 23/10 South Africa became available to several areas of the US. WA6BYA worked Z23JO in Zimbabwe; later he and N8AMG and K6QXY worked ZS3AT and ZS3E. These were eventually worked by stations in Ohio and Texas. On 7/11 an excellent opening allowed K71CW to hear Z23JO on his IC-502 and whip antenna.

Between 25/10 and 31/10, W6JKV and K6MYC visited the island of Ponape in the Republic of Micronesia, taking a two metre EME set-up plus six metres, on which band they had QSOs with four KL7s, six KH6s, six 9H1s, one ZL, five VS8s, 14 VKs, the western portions of the US and Canada, KG6DX and some 300 JAs. The calls used were V68JT and V63AU.

## Letters

Several letters arrived while I was in hospital, and must now be mentioned.

Don, VK6HK, has written to include an update of his Six Metres Listing and added that his recent most memorable day was on 31/10/89 when the band opened to Europe around 0830. He had 50 QSOs (which included some phone and CW duplicates) in G, GJ, GW, PA and SM. One beacon, GB3NHQ, was copied at 569. Signals ranged from threshold to S9 until about 1045. Plotting the Maidenhead Locator Squares for all these contacts showed the target area was confined to an arc of shallow width from Wales, Southern England, Holland and Sweden.

Graham, VK6RO, has lifted his score to 17 countries when he worked PA0HIP at 1052 and PA3ANU at 1114 on CW on 27/10; on 28/10 he worked VS6XVD and VS6XCL around 1150.

Steve, VK4KHQ, writes from Mount Isa to say that six metres had been relatively quiet since 7/1/89 despite hearing beacons in VK2, 4, 5 and 8. When the band is open to JA Steve usually tries RTTY and has had a number of successful contacts using this mode. On 6/10/89 he worked JH1WHS for the eighteenth time, including six RTTY contacts.

Bruce, VK4KIT, also of Mount Isa, worked KG6DX on 19/8 and VS6XWU on 28/10 at 1313 UTC. A comment from Bruce was that 49 MHz video signals have been audible from the north to NNW on most days of the year between 0400 and 0800 and again from 0900 to 1300.

Neville, VK2QF, in a letter dated 5/11/89

said to that date 50 MHz had been rather unproductive. Only two new countries had been worked. HH7PV at 2138 on 19/9 and V63JT at 0502 on 28/10, giving him 51 countries confirmed and a final total of 54 countries when the above two and XF4L reply I attempted a follow up to determine the present position but four telephone calls could not catch up with the elusive Neville!

Nev commented that to 5/11 nothing had been heard from Europe despite many hours of monitoring and calling. Moscow and Scandinavian TV were prominent. On 29/10 with 48 250 and 49 750 videos at S9, he found another video on 53 7396 at 0850. This was subsequently identified as an Italian inverted channel (video at the high end and audio on 48 2396), however no contacts were made.

Commenting on the 50 MHz beacon situation, Neville believes there is little value in beacons as most amateur stations have a greater ERP and contacts are usually established without reference to the beacons. Also, the Wagga Channel 0 TV 100 kw of video on 46 24 and 10 kw of sound on 51 74 are becoming well known overseas; these frequencies, together with those of other TV stations and two-way radio traffic and paging signals between 40 and 60 MHz all provide useful warnings of possible contacts on 50 MHz.

## Brunei

Andrew, V85DA, at Brunei said in a November letter that apart from almost daily openings to JA there has been little six metre activity from his area. On 6/11 he could hear the JAs working to the west coast of USA, V63 etc. but nothing at Brunei. However, at 0200 he worked HL9TG with 559 fluttery signals.

He comments that it appears the F2 layer works well away from the equator, but the E layer is so excited in equatorial regions that no signals can get down to the ground. So F layer supports DX and E layer traps the signals between E and F until it gets out to a low E-ionisation area. That's the way he sees it!

Looking at Andrew's list of contacts for September/October/November there are a couple of hundred JAs, almost daily contacts to Darwin through September 25/9 at 1444 to VS6XVD and VS6XCL and on 11/10 VS6WV. On 25/10 at 1320 he worked VK8AH who reported he had worked 9H, 8V and had heard European beacons. 1/11; 9V1RH reported PA to VKQSOs had occurred on 30 and 31/10.

Regarding the value of 52 MHz, Andrew says it is educational to hear what signals are on that part of the band when the band is open to JA. At times he can hear FM conversations on every 10 KHz from 52 to 54 MHz. On 52 525 there seems to be a packet BBS station which makes it rather pointless calling CQ DX on that frequency. Another interesting signal sounded like a repeater, with squelch tails, mobile flutter, traffic noises etc., but then, officially, there are no repeaters in Japan!

During a September spell in Darwin, Andrew was given royal treatment by the local amateurs. Rex VK8RH has a six metre amplifier running 200 watts from 12 volts. While in Darwin, the locals were continuing

to work JA on two metres SSB, with VK8RH having worked over 150 JA stations. Rex also monitors 52 525 FM and this later resulted in Andrew V85DA working him on returning to Brunei.

At the end of October Andrew attended a SEANET Convention in Singapore where the attendance was about 150 amateurs plus families. He met a number of JAs he had worked, plus many of the 9V1s, 9M2s and 4S7PB.

While in Singapore he operated on 50 MHz as 9V1ES and during the week of operation worked about 700 contacts, all JAs except four to VK8. The station was sponsored by JA1UT.

Finally, Andrew asks the question — what propagation path is being used for the VK to Europe contacts is direct, short or long path, or backscatter? As far as I can determine, the signals have been mostly direct and on the short path but occasionally a few weird paths have been involved, such as 45 to 90 degrees from an apparent direct path.

## Melbourne News

John, VK3ZJC, says he has spent a few hours sorting out the beacon and repeater listings in the new WIA Call Book and has so far found 32 mistakes! He also reports that increasing packet activity on 144.800, the Adelaide VK5VF beacon frequency, virtually precludes any reception of the beacon in Melbourne. That being so, it seems inevitable a frequency change will be necessary.

On 20/10 there was an auroral opening to VK7 on six and two metres. On 22/10 it was reported that VK5NC in Mount Gambier had worked VK1BG, VK2ZRE and VK3XRS all with their beams pointing south.

John reported that activity on 1296 was low during the winter months. He maintains regular propagation checks with Roger VK3XRS in Bairnsdale. Signals are subject to some slow QSB and vary from 6 to 10dB above the noise. When Roger leaves his Keyer on for extended periods, John has noted peaks around 0100 and 0700, very poor from 0730 to 1000. In the evening there is a further peak around 1030 followed by a steady decline extending at times to a further peak around 1500.

A letter to John from Ross VK2ZRU indicates there are about five SSB stations on 1296 MHz in Sydney and none in country areas. They are also starting to have problems with FM-only stations on 1296 100. Ross runs a water cooled 2C39 linear on 1296 with 250 watts input, with four 28 element loop yags and a GaAsFET preamp.

In Melbourne recently, a group of FM-only and multimode stations discussed the problem of FM on 1296.100 and came to an agreement to keep that frequency clear and use 1298 100 MHz for FM. The reason for this choice is that most of the SSB stations also use FM for ragchewing and crossbanding, some have transverters from two metres which can cover only 1296 to 1300, so 1298 100 has become an unofficial net. When the new band

plan is finally promulgated, the FM-only stations will be able to use any frequency within their range but using 1298 100 for an unofficial net and hause frequency and leaving 1296 100 for narrow band modes.

In VK3 there appear to be about 34 stations with 1296 MHz capability, 16 are using SSB and horizontal beams and 6 are located outside of Melbourne.

## The World Above 50 MHz

Congratulations to QST magazine which in December 1989 celebrated 50 years of presenting the segment "The World Above 50 MHz." At present the columns are prepared by Bill Tynan W3XO, with whom I exchange monthly information. In December 1939 Ed Tilton, W1HDQ, presented the three pages with the title "On the Ultra Highs." The band was then called five metres and consisted of 56 to 60 MHz with the record trop distance being 450 miles W9ZJB of Kansas City, Missouri, was the first amateur to work all nine call areas of the US. His equipment consisted of a pair of T-20s running 120 watts and the receiver used was a Hallicrafters S-10.

The columns also included information on the use of 112-116 MHz where W1KH used a Western Electric 316A "door-knob" tube capable of 8 watts. He also used a pair of RK-32s running 300 watts! In the Boston area distances of 25 miles were being covered regularly. Reports were also included for the 224-230 MHz band.

Ed Tilton now lives in Florida and has the call W1HDQ/4.

## Closure

As I am slowly getting back into harness I will close the column at this point, allowing room for the Six Metres Standings information.

Two thoughts for the month: "One man cannot hold another man down in the ditch without remaining down in the ditch with him" and "If you look like your passport photo in all probability you need the journey."

73. The Voice by the Lake

## 50 — 54 MHz DX Standings

DXCC Countries based on information received up to 15 Dec 1989. Cross-band totals are those not duplicated by six metre two-way contacts. Credit has not been given in columns 1 and 2 for contacts made with stations when 50 MHz was not authorised.

Column 1:	50-52 MHz two-way confirmed
Column 2:	50-52 MHz two way worked
Column 3:	Cross-band 52 to 28 MHz confirmed
Column 4:	Cross-band 52 to 28 MHz worked
Column 5:	Countries heard on 50 MHz

Column 6: Countries heard on 52 MHz  
 Column 7: 50 MHz two-way worked  
 (1983-30/6/1989 — temporary listing)

Call Sign	1	2	3	4	5	6	7
VK8GB	42	42			13		
VK4ZJB	32	32				4	
VK2BA	31	32					18
VK2VC	27	27					25
VK2QP	27	29					
VK2DDG	25	26		2	12	3	
VK3OT	25	26			10		
VK3XQ	24	26			1	1	
VK3AWY	22	22					
VK2KAY	21	23					
VK5LP	21	22			6	3	8
VK2BNN	20	21					
VK4ALM	20	20					
VK4TL	19	19					
VK7JG	18	20			2		
VK4ZAL	18	18					
VK3AMK	17	17					
VK9XT	17	21					
VK3AUI	17	21					
VK3NM	16	17					
VK6RO	16	18	3	3	7	3	
VK4ZSH	15	16					
VK2ZRU	15	16			1	3	
VK3ZZX	12	13					
VK9YT	12	14					
VK6HK	12	18	1		1	1	9

VK4KHZ	10	10			12
VK6OX	10	10	1	1	
VK8ZLX	10	13			32
VK4BJE	7	7			3
Overseas					
JAZTTO	48	48			6

Column 7 lists those 50 MHz contacts between 1963 and 30/6/89 which have been supplied to me and NO DISTINCTION IS PRESENTLY BEING MADE no matter from which State they have been received, or any relevant QSL information. The present separation between 50 and 52 MHz will assist me to make a decision as to credibility at the appropriate time. All Standings information (from day one) is now stored in the computer so that any adjustments should be relatively straightforward.

A minimum of five countries confirmed (including VK) is required for an operator to be listed.

The list position is determined by the number of confirmed contacts. Where two or more operators claim the same total, those first date listed with that total can only be displaced by another having a greater number of confirmed contacts.

The next list will appear in August 1990 and entries will need to be on my desk no later than 20 June 1990. Claimants are reminded that full details of all contacts are required,

viz: date of contact, time in UTC, call sign of station worked, country, mode, report sent and received, QSL sent and whether received, split frequency contacts should be indicated. Please add your own call sign, signature and date.

I reserve the right to request and examine any QSL cards which may be needed to support an application for listing. To assist your claim a useful idea is to include photocopies of the front and back of QSL cards.

PLEASE NOTE Those operators who have already claimed 50 MHz contacts after 1963 and prior to 1 July 1989 are asked to submit a new list of countries worked between 1/7/1989 and 15/6/1990 as many possibilities exist for countries already nominated to be re-worked during the coming autumn period of peak F2 activity.

Eastern States operators who worked 50 MHz stations last autumn and earlier should not need to be told that they should try and work all of them again this autumn, especially if contacts were made after 0000 UTC which will probably be used as a cut-off time for Six Metre Standings Listings for 50 MHz contacts made during the past few years. From an examination of photocopies of many QSLs forwarded to me by claimants it is becoming quite clear that many Eastern States 50 MHz contacts were made prior to 0000.00.

## HOW'S DX

STEPHEN PALL VK2PS  
 PO Box 93 DURAL 2158

## Bouvet Island 3Y5X — 3Y0B

By the time you read this, the Club Bouvet DXpedition has successfully completed its task. The ship "Aurora" left Norway early in December for South America. In mid December at Montevideo, Uruguay, the amateur operating team joined the Norwegian scientific and helicopter crew on board the ship and headed to Bouvetia, as the island is called in Norwegian. The expected time of arrival at the island was Christmas day. Whilst on the high seas they used the call sign LA5X/mm to relay information about the progress of the voyage. The ship arrived at its destination on the 28th of December. No landing was possible on that day due to fog, blizzards and 24 feet high mountainous seas. Finally, they managed the lift-off by helicopters from the ship on the 27th of December 1989, and started operating on 14145 kHz transmit frequency and receive from 14200 to 14220 kHz on multithop frequency basis. This operating procedure caused some confusion, and suddenly quite a number of "weirdo" operators (among them some suspected pirates) appeared on the well publicised and pre-announced frequencies.

Australasia is one of the most difficult places on Earth from which to contact Bouvet.

The Americans and the Europeans heard them with signal strength 8-9, but the Sydney-Auckland-Norfolk Island area heard them only with a signal strength of S3 or less. The path to Bouvet is almost due South (SP) or due North (LP). The duration of the group's stay on Bouvet was 23 days. The expedition had five complete loom stations. Up to the 3rd of December, the expedition had received 85.9% of donations towards its \$100,000 target. Operation was SSB, CW, from 160 to 6 metres, RTTY on 20, 15 and 10 metres. The best chance to contact them from VK was on 20 metres. We hope that many of you made the contact with this very rare DX country.

If you missed the 3Y5X activity, then be prepared for the Legion of Indianapolis DXers with the call sign 3Y0B which should operate from Bouvet early or mid February. Besides Bouvet, this group hopes to go to South Sandwich Islands and activate that group under presumable VP8 call sign.

## Laos XW8 And Vietnam 3W0

January issue of "AR" gave detailed news of the re-activation of this much sought after country. Inb, the operator of XW8KPL is still active on a variety of frequencies. The station was established with the assistance of six

Japanese amateurs under the leadership of Yoshi JA1UT. The station is in Vientiane at the National News Agency of the Peoples Democratic Republic of Lao, Khaosane Pathet Lao (KPL). The operating times are around 0400 to 0700 UTC and after 0900 UTC. They were heard on 14165, 21295, and on 28 MHz. QSL only by direct mail to the address given in January 90 issue of "Amateur Radio". Please do not send "green" stamps for return postage (US dollars) — only 3 IRCs (International Reply Coupons) and self-addressed reply envelope.

The Hungarian DX group, HA5FP — Zoli and HA5WA — George, arrived in Laos in the last days of November. They had considerable difficulties getting on air. Why? Details are sketchy. At one stage we heard that they have been denied the operating licence, later we were told that they have now the licence, but the owner of the hotel where they were staying did not permit them to put up their antennas. When they became active on the 8th of December 1989 with the call sign XW8DX and XW8CW many who worked them in the beginning doubted that they were genuine. They operated on 21035 — 21235 28025 — 28495 and 14195 kHz. When I spoke to them for the last time on the 20th December, they had over 18000 QSOs under their belt. They participated in the ARRL 10 metres contest with more than 2000 QSOs and about 50000 points. They planned to go back to Hungary on the 27th of December. The Spratly operation of this group did not eventuate. Unconfirmed reports said that "they missed the boat" QSL to F6HIZ.

If you missed the Hungarians, maybe you have worked the Japanese in Laos. XW8KPV was on the air on the usual DX frequencies from the 22nd of December until the end of December. QSL to JH1AJT.

To make the DX activity on the bands more exciting, XV2A from Vietnam has appeared on 21274 kHz at 0600 on the 22nd of December, operated by a Japanese group QSL to JA3UB. And another group was scheduled to operate from the 31st of December to the 5th of January under the callsign 3W0JA. QSL to JA7JFZ, to the Callbook address direct.

## Macquarie Island - VK0

John, VK0JR arrived at Macquarie Island at the very end of November and appeared on the band on the 6th of December, "Saint Nicholas" was John originally comes from Canada, married an Australian and settled in Perth 10 years ago. QSL to VK9NS.

## Western Samoa - 5W1

Had a long QSO with Pete 5W1KT. He is on a two year contract with the Western Samoan Government, and will be in 5W1 until the middle of 1991. Pete set up his station not so long ago, and is now in the serious DX-ing stage. There is no QSL Bureau on the Island and the local Amateur Club is practically defunct. Pete came to VK6 some time ago from South Africa, and was always interested in Amateur Radio since he was a boy. He started as a novice in VK8 and now he has his home call as: VK6KT. Pete has a vertical antenna for 20-17-15 and 10 metres, but hopes to have a beam soon. Pete will do his own QSLing and his logs are computerized. QSL cards have been ordered and QSLs should be sent to: PO Box 1672 APIA, Western Samoa, South Pacific.

## Rotuma 3D2

Bing VK2BHC went back to Rotuma and started operating under the call: 3D2XV. Soon afterwards he fell ill and he had to leave the Island. At the end of December he was improving but still sick. In the name of our readers we wish him a speedy and full recovery.

Rotuma, however, continued to be active. Mats, SM7PKK arrived in Rotuma mid-December using the callsign, 3D2XR. He intended to stay on the island until the third week in January QSL to SM7PKK.

## Anguilla - VP2

Every keen VKDX'er would at some time have worked Paul VP2EXX (Ex V47NXX). He is a first class operator in every sense and is

often in demand for DXpeditions and multi-operator Contests. Earlier in the year he was on Descheche KP5 with KP2A and more recently he was on St Lucia for the CQWW CW contest as N9AG/J6L and J6DX (QSL to: N9AG). A long term plan for Paul is to visit his friend UA9MA in Omsk in August 1990. Paul speaks good Russian, so he is very popular with the UA operators. If he does make the trip, he will be acting from several Oblasts. At the age of sixteen Paul has earned his Big Gun station. QSL for VP2EXX and V47NXX to KC8JH.

## Banaba Island And Conway Reef

It is now official. The ARRL Awards Committee has accepted the 16 member DX Advisory Committees recommendation to accept the Island and the Reef as a new DXCC Country, but only contacts after the 1st of March 1990 will be valid. Previous contacts made from Ocean Island (Banabas former name) will count, provided that the operator and his station was physically on the island when the contact was made.

At the same time, applications for Frederick Reef, Marquesas Islands, Tutoosh Island and Guemes Islands were not recommended for DXCC Status.

The only application for a separate country status is now Walvis Bay; the South African enclave in Namibia according to several sources. Walvis Bay, known until now as ZS1, has changed prefix. Ian ZS118 is now signing ZS9A. The Walvis Bay application will be considered by the DX Advisory Committee in mid-January 1990.

## Interesting QSOs And QSL Information

WA3ZXX/KP4 — Jeff — 14226 kHz at 1150 UTC. QSL to: KP4GY.

KH0AC — Len — 14226 kHz at 1222 UTC — QSL direct to K7ZA.

ZS500A — Special event station — 14220 kHz — QSL to: W3HUP.

OD5KB — Sami — 14220 kHz at 0612 UTC. Sami is employed at Beirut Airport — QSL to callbook address.

V73AT — Ted — 14165 kHz at 1115 UTC. Ted's former callsign is KX6HE. QSL to: K2CL.

5W1HM — Kiyoko (yl) 21250 kHz 1045 UTC. QSL to: JH1HFF.

NH6RT/P/KH8 — Kiyoko's other callsign (details above).

VE3DJ/V2A Jack 21248 kHz at 0326 UTC. QSL to: homecall.

KG4DD — Doug — 14235 kHz 0637 UTC. QSL to Box 692 FPO NY. Zip: 09593-

0055 USA.

F6IGS/FO — Gerry — 14233 kHz at 0940 UTC. QSL to the French DX Foundation. PO Box 88, BRUZ, 35170, France.

TAIAL — Mustafa — 14222 kHz at 0600 UTC. QSL to 1990 Callbook Address.

HS0E This is a Thai Club callign and it is used by different visiting amateurs. You should ask for the home call of the operator and the QSL route. Between the 7th and 12th of December, the operator was John, K9EL (QSL to home call). On the 20th of December the operator was Sombat, HS1BV.

9M8FH — Festus — 14226 kHz at 1214 UTC. QSL via the Bureau or Callbook.

VU2GI — Govinda — 14226 kHz at 1218 UTC. QSL to: N2HOS.

IK2QNW/V73 — Andriano — 14222 kHz at 0603 UTC and T29GM on 14195 kHz. The operator was Andriano again who is on a Pacific DX tour. According to unconfirmed reports he fell ill with high fever and left for Italy via Hawaii. QSL to home call.

F6ESG/OD5 — Patrice — 14 MHz — CW — at 0430 UTC. QSL to home call.

3A2LF — Claude — 14 MHz CW at 2050 UTC. QSL to: callbook address.

PJ2OH6XY — Carl 14 MHz CW at 2100 UTC. QSL to: home call.

9H3GQ — Werner — 21 MHz CW at 0400 UTC. QSL to: DK4SW.

HB9AHA/J6L — Rene — 21 MHz CW at 2100 UTC. QSL to: home call.

ZF1HJ — Jack — 21 MHz CW — at 2200 UTC. QSL to: PO Box 1215 George town Grand Cayman Island, Caribbean.

XX900 — Fred — 21 MHz CW at 0900 UTC. QSL to: F Fisher 259 W Cook Rd Mansfield — OH 44907 USA.

CN8MC 21 MHz CW — 1100 UTC. QSL to: Association de Radio Amateurs du Maroc Box 299 Rabat, Morocco, Africa.

VP2EM — Harold — 21 MHz — CW — 0100 UTC — QSL to: KV4AM.

HC8HC/LT — Luis — 21 MHz. CW 0430 UTC. QSL to: LD Troya, Box 289 QUITO ECUADOR South America.

P29VPY — Paul — 21 MHz CW at 0617 UTC. QSL to: K1XM.

9K2KS QSL to: ON7LX — TZ6VV QSL to: NOBLD — T78GA QSL to the French DX Foundation (see address above) — Y10BIF QSL to: KAIDE — V29OA QSL to: W7KNT.

HP1XSO QSL to: Box 842 Clayton Rep of Panama. J88BS QSL to: WA4WID — IY0ONU Special UNICEF station. QSL to: I5IKW — ZS5UF QSL to: PP5AA — HS2ZW QSL to: IK8DOI — YJ1TRS QSL to: PO Box 217 Port Vila, Vanuatu CO2OM QSL to: Box 4910 Havana 4, Cuba 6W7OG QSL to: F2YT — P29CG QSL to: WB9SVK, call book address. H20AB QSL to: K8PYD — XX9KA QSL to: KC9V — ZF2HR, QSL to: SM5BS KA5UW/KH2, QSL to: WD5GJV — ZW0F QSL to: PY7ZZ.

# From Here And There And Everywhere

Jean Pierre 575SR (Mauritania) has been coming up on 10 metres around 28555 kHz at 2200 UTC. He has been also on 21280 kHz at 0930 UTC QSL direct only to PO Box 51, ATAR, Mauritania, Africa

Jimmy, JH1MAOJD1 (Minami Torishima) operated on 28477 kHz almost daily in November QSL to his home call JD1YAA, Aki, was heard also on 28581 kHz QSL via JA10GE or Bureau Dimitri SV5ADM was calling CQ on 28522 kHz at 0655 UTC. The band was very quiet, and he was a good one for the log from the Dodecanese Islands. QSL to Callbook address. OD5KB says that Hany OD5KV, who was very active last year on the 21205 and 14222 nets, has moved to London, and will try to obtain a G callign. Jorge D2/LU6ELF, on short notice, appeared on the "222" net on the 14th Dec. A few VKs managed to contact this elusive station. QSL to N4THW. Mr Carlos A Vega PO Box 22541 Ford Lauderdale Fla, Zip: 33335 USA. Brazilian stations using the additional suffix of /PR100 are celebrating the 100th Anniversary of the Republic of Brazil. According to unconfirmed reports, Piet, a Dutch missionary will shortly commence operations from the Central African Republic under the callign TL8PN. The Knights of Malta station, LA0KMF intended to be active for 24 hours on Christmas Eve. However the operators decided to postpone the activation of the station to a date somewhere in 1990

Reason: There is too much DX activity at the moment, and they do not want to compete with the others.

Xenon, LU1ZA was active for one year from

South Orkney Islands situated in the Antarctic Atlantic Ocean. At the very end of his stay, with the assistance of Sergio LU1HIM on the Argentinian end, and Jim VK9NS on the Australian end — under difficult propagation conditions — he came up on the "222" net. A few VKs and ZLs were successful in establishing contact. Xenon is an army officer and his tour of duty ended before Christmas. QSL to: LU2CN Trevor, VK9TR is part of the meteorological team on Wilkes Island. he will be on the island for 6 months. He is very busy professionally, which leaves little time for him to enjoy amateur radio. QSL to his home call: VK5FG which used to be his late father's callign.

## Oops...Or The Mistakes Department

It had to happen, sooner or later...in the December 89 Issue of "Amateur Radio", page 37, under the item dealing with the "222" net there is a mistake which was discovered by the writer of this column as soon as I saw the printed copy of the magazine, and by Jim VK9NS and Neil VK6NE, but nobody else, which surprised me. The Heard Island Expedition by Jim and Kirsti was conducted under the callign of VK0JS and VK0NL. The call signs VK0HI and VK0CW were operated by Dave Shaw VK3DHF and AJ Fischer K8CW from the 21st of January to the 21st of February 1983. This other DXpedition was organised by the VK6 DX Chasers Club and was connected with the mountaineering group of William Blunt. The mountaineers were the second group which climbed Big Ben at the top of Mawson's Peak. The whole group travelled in the maxi-yacht Anaconda II.

Jim's expedition, VK0JS, was sponsored by the Heard Island DX Association (HIDXA) and used the British built 156 feet ex-whaler, Cheynes II which underwent a massive re-fit prior to departure to the island. The HIDXA Expedition had 18 members including several scientists, and researchers. The amateur group consisted of Jim VK9NS, his wife Kirsti VK9NL, Sjoerd (Sjo) VK0SJ, Bob WA8MOA, Walt W7SE and Werner OE1LO. The expedition made approximately 14000 plus contacts with 138 countries. The voyage to Heard Island and back to the mainland is a story for itself. Blizzards with winds gusting to 60 knots, seas with 20 to 30 foot waves, shortage of water (Cheynes II was a steamship) and shortage of fuel on the way back. This necessitated to use makeshift sails made of old lorry tarpaulins. The ship actually "sailed" 855 nautical miles in 368 hours at an average speed of 2.34 knots. The armchair DXpeditioner sitting in the shack making the short contact which gives a new, "DX country", never realises the difficulties endured by the dedicated to put a new "DX country on the air.

## The Big Question

Have you given further thoughts to the series of questions posed by me in the January 1990 issue of "AR", in the "How's DX" column? Did you voice your opinion by dropping me a line to PO Box 93 Dural 21587? If the answer is yes, I thank you for your cooperation. If the answer is no, then please read the end of the January 1990 DX column again. I would like to publish the results as soon as possible, but I need your comments first.

Finally many thanks, for the assistance received from Pat VK2RZ, Les VK4DA, Neil VK6NE, Jim VK9NS, Yoshi JA1UT and the DX bulletin "QRZ DX".

73 and good DX to all of you.

AR

## EMC REPORT

HANS RUCKERT VK2AOU EMC-REPORTER  
15 BERRILLE RD BEVERLY HILLS 2209

## Several EMC Short Stories

### 1) Canadian Success Story:

(from Radio Communication 6/89 and CQ/DL 11/89)

Readers will remember the reported very sad story of the VE3SR Jack Ravenscroft court decision (AR 11/1988): Raymond Perrin, the Director of the CRRIL in Ontario, VE3FN, reports that a neighbour of a radio amateur had claimed that several of her technical appliances were affected by the transmission of the next-door radio amateur. At first, the court decided that the radio amateur had to stop operation. She had refused any attempts to have the susceptibility of the

equipment overcome. Mr Perrin was acting as defence expert, and he was supported by all other experts including the observer of the Department for Communication. The judgement has now been reversed, so that the owner of the appliances has to have her apparatus modified. Mr Perrin stated that:

a) A transmitter can then only cause interference if the transmitter does not meet the legal technical standards.

b) A transmitter can never cause an equipment malfunction, if the equipment is not designed to be a radio receiver.

c) If this kind of equipment is affected, then it is only caused by design faults of this equipment.

d) The claim, that the unwanted effect does disappear, when the transmitter is switched

off, is technically wrong.

Mr Perrin made the following statement: "If rain gets through a roof, it does not mean that we have to stop the rain. We have to fix up the leaking roof, because the problem is caused by the leaking roof."

It is hoped, that this will be considered a worldwide test case; that the law-makers will place the blame where it belongs, and that the public will be educated accordingly.

### 2) Audio and VIDEO Plug Connections:

(By DG40AA) CQ/DL 11/89: A number of widely used plugs are shown, which rarely provide shielding. Many examples had an interruption of the earth to equipment contact, or no reliable earth contacts. Pressure contacts instead of soldered contacts are often unreliable. Metal particles containing paints are often not conductive at all. Only all metal plugs and connectors and jacks should be used to avoid EMC problems even with correctly designed appliances.

3) Cable-TV and Satellite-Operation (By DC8TS, AMSAT-DL 2/89) I experienced

during the last months interference to my 2m satellite reception, because the special channel-6 was used by the Cable-TV operation. 145.739 and 145.981 were particularly affected. There was a splatter between 145.94 and 146.00 MHz, the degree of which depended on the modulation of the TV signal. The test tone was still audible after closure of the transmission, and other frequency affected especially the reception of the R-6 relay channel. This interference is totally unacceptable being caused to an amateur radio exclusive band. It is at best wishful thinking by the cable-TV firms, that their system is RF tight. The Americans found out already many years ago — and that is still so — that cable-TV transmission is not as RF tight as claimed. This system caused interference to amateur radio reception and it picked up legal transmission as well. VK3QQ reported these problems years ago. After collecting the necessary details, I wrote to the cable-TV firm, who claimed that they cannot find anything wrong with their set-up, and they know nothing about an exclusive amateur radio frequency band. They stated that they were willing to ask the Post-Office about this last point. It was between Xmas and New Year, when a

PMG testing vehicle stopped suddenly at my house. They confirmed the interference observations. With a 20 dB preamplifier working at 145.981 MHz the S-meter of my receiver deflected 60% of full scale over an azimuth range of at least 90. The officers found that an inadequately shielded cable going to the TV-set caused the leakage (this is usually the case). When the correct cable and the PMG-TV set was used, no trace of interference was observed, but who has a TV-set in a shielded metal case? The behaviour with my low noise preamplifier is now as it was earlier without the preamplifier. It is clear, that Cable-TV is quite unable to be sufficiently RF tight not to interfere with preamplifier receivers using the amateur radio frequency band. Cable-TV must never use amateur band frequencies, and they know that this will cause RFI. The firms who plan now to introduce Cable-TV should be told now that Amateur Band Frequencies must never be used for their service.

#### 4) Channel 8-6 in Sweden: (CQ/DL 12/89)

The Standards Commission (SIS) of Sweden laid down Standards for the Cable-TV service as reported in "QTC" 7/89. The new standard was established by the Svensks

Elektriska Commission (SEK), committee TK12X included representatives of the Swedish Amateur Radio Organization SSA. The following channels must not be used for Cable-TV to avoid possible interference to aircraft communication: S-1 to S-5 (108-139 MHz), S-12 (242-244 MHz), S-24 — S-25 (328 — 335.4 MHz). To protect emergency traffic S-33 to S-34 (405 — 407 MHz). Also the following channels should be avoided to avoid interference to the Amateur Radio Service: S-6 (144-146 MHz) and S-37 (432-438 MHz). It is hoped that other countries and their Cable-TV companies learn from this Swedish understanding of the problem before they start to use certain channels.

#### 5) Signal splitters and combiners - a risk of EMC problems: (DL/7AOH CQ/DL 8/89).

This publication shows x-ray photographs of a number of signal splitters and combiners. The lack of shielding and reliable connection for the earthed wires was found to be the main fault. The technical data supplied were in some cases misleading. Only totally shielded units can be recommended. Unreliable contacts were also found in one case. Completely shielded units with soldered connections inside were found to be OK. ar

## CONTESTS

FRANK BEECH VK7BC FEDERAL CONTESTS MANAGER  
37 NOBELIUS DRIVE LEGANA 7277

#### February:

24 — 25th REF French contest, Phone section (Rules December "AR")

24 — 25th UBA Belgian contest, Phone section (Rules January "AR").

#### March:

10 — 11th RSGB Commonwealth contest. (Rules January "AR").

17 — 18th NZART National field day contest  
17 — 18th WIA John Moyle Memorial Contest. (Rules this issue.)

The three main contests that attract VK/ZL stations next month are listed in the above calendar. Since the publication of the rules of the RSGB Commonwealth contest in January's "AR", I have been advised that a group of amateurs in Victoria have obtained permission to run a "HQ" station in this year's event, and will compete using the callign VK3WIA. This station, like the "HQ" stations in other Commonwealth countries will attract bonus points, so are well worth the effort of contacting.

In the John Moyle contest, which coincides with the ZL field day contest, VK amateurs are encouraged to work the ZL stations, but please note, the repeat contact rule: for all overseas contacts, ie, ZL, W, DL, etc, no repeats are allowed — just the normal one contact per mode per band as in almost all

international HF contests.

Due to the amount of time that I have spent during the Christmas, New Year period looking out for the Bouvet DXpedition, and putting the finishing touches to the 1989 RD logs, these notes will be shorter than usual. I hope you all send in logs for the Ross Hull contest and the second trial VHF/UHF field day contest. Please do not forget.

## John Moyle Contest Period

From 0100 UTC March 17th 1990, until 0800 UTC March 18th 1990.

## Objects

To encourage portable operation on the amateur bands by Australian amateurs, and is intended to help amateurs become familiar with portable operations, and thus assist in training them for emergency situations. Emphasis is placed on working between portable stations.

## Divisions

There will be two divisions;

Division "A" 24 hours.

Division "B" 6 hours.

In each division, the operating period must

be continuous within the time period allocated for the contest.

## Sections

In each division there will be separate sections as follows;

"A" Portable field station, TX phone single operator.

"B" Portable field station, TX CW, single operator.

"C" Portable field station, TX Open, single operator.

"D" Portable field station, TX Phone, multi-operator.

"E" Portable field station, TX Open, multi-operator.

"G" Portable field station, TX VHF, multi-operator.

"H" Home station TX, emergency powered

"I" Home station TX, mains powered

"J" Receiving stations.

## Station Definition

A portable station is one which operates from a power supply which is independent of any permanent installation, ie batteries, solar, wind, portable motor generators.

A SINGLE OPERATOR station is one where the work involved in setting up the station is carried out by the person who operates the station. No assistance can be received apart from the provision of food and security etc.

A multi-operator station is self explanatory.

No radio apparatus may be erected on the site earlier than 24 hours before the contest period commences.

## Bands

All amateur bands may be used with the exception of the 10, 18, and 24 MHz bands.

## Multi-Operator Stations

Such stations shall provide a separate log for each band used.

Only ONE transmitter may be used on a given band at any one time, whether operating in phone or CW mode.

ONLY ONE CALLSIGN may be used from a multi-operator station.

## Contacts

Cross-band contacts are not permitted. Cross-mode contacts are permitted. However they will count only as phone contacts for scoring purposes.

## Contest Exchange

The exchange between stations will consist of a cypher comprising the RST report as applicable, followed by a serial number commencing with 001 and increasing by one for every contact. Following the serial number, a letter must be added indicating the section "A" to "J" in which the station is competing. Both cyphers sent and received must be entered into the log.

## Repeaters

Operation through any terrestrial repeater is not allowed for scoring purposes. However, the use of such is allowed for the purpose of arranging contacts. Contacts made by using orbiting satellites or EME as a medium are allowed.

## Modes

AM, FM, SSB, all count as phone. RTTY and CW are both regarded as CW. It would not be expected that the more exotic modes would be used in this contest.

## Scoring

Scoring for portable field stations.  
 Portable/mobiles outside ones own call area ..... 20 points  
 Portable/mobiles within ones own call area ..... 15 points  
 Home stations in section "H" outside ones own call area ..... 10 points  
 Home stations in section "H" within ones own call area ..... 5 points

Station "I" irrespective of call area. . . 20 points  
 ZL stations who are in the NZART field day contest and are portable ..... 20 points  
 Other stations who are in the NZART field day contest ..... 10 points

Scoring for Home stations, emergency powered.

Portable/mobile stations outside ones own call area ..... 15 points  
 Portable/mobile stations within ones own call area ..... 10 points  
 Home stations section "H" irrespective of call area ..... 2 points  
 Home stations in section "I" irrespective of call area ..... 2 points

Scoring for home stations mains powered.  
 Portable/mobile stations outside ones own call area ..... 10 points  
 Portable/mobile stations within entrants own call area ..... 5 points  
 Home stations in section "H" irrespective of call area ..... 2 points

IN ALL SECTIONS A STATION MAY BE WORKED ONCE ONLY PER BAND, PER MODE.  
 CW contacts. In all categories CW to CW contacts will earn double points.

## Bonus Points

For any contact made by using a natural power source, a bonus of 10 points may be added. A natural power source is regarded as one the power for which is derived from solar cells, wind, methane gas etc, as well as from batteries which are completely charged by natural means. All power produced in this category must have been derived independently of commercial mains or the use of petroleum derivatives.

## Receiving Stations

Stations in this section must record the cyphers being sent by the stations operating in the contest within sections "A" to "G" inclusive. QSO points will be on the same basis as for Home stations section "I".

## Log Format

All logs shall be set out under the following headings,

Date, Time (UTC), Callsign of station worked, Band Mode RS/RST and serial number sent, RS/RST and serial number received QSO points, Multiplier Bonus, Total claimed.

Each log page must carry a progressive

IAN J TRUSCOTTS

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 (03) 723 3094

total points score claimed at the bottom of each sheet

## Summary Sheet

For bonus points to be claimed, suitable evidence must be provided as to the method of natural power generation employed. Such evidence should take the form of a photograph of the generating equipment used, or a signed statement by another amateur, showing his call sign, declaring that he has inspected the generating equipment referred to.

## Front Sheet

Each log must be accompanied by a front sheet that provided the following information: Name, Address, Callsign, Division (6 or 24 hours), Section (A to J), Station location, Number of contacts, Claimed score.

The front sheet must also indicate:

Equipment used. Power supply used, and in the case of multi-operator stations: a list of all the operators names and call signs, together with their signatures. The front sheet must also carry a declaration signed by a licensed amateur as follows, "I hereby certify that this station was operated in accordance with the rules and spirit of this contest."

## Certificate And Trophy

Certificates will be awarded to the winner in each section of each division. The 6 hour certificates cannot be won by the 24 hour entrants. The Contest Manager also reserves the right to award other certificates where the effort made by a specific station is of special worthiness. The highest CW scorer outright in the contest, irrespective of the section of the contest entered, will receive a trophy in the

form of the Presidents Cup to hold for a period of twelve months. This award is to encourage operators to utilise the CW mode whenever possible.

## Disqualification

The general WIA contest disqualification criteria as published will apply to this contest.

## Log Submission

Logs should be forwarded to the Federal Contests Manager

Frank Beech VK7BC, 37 Nobelius Drive, Legana, Tasmania 7277.

The front of the envelope should be endorsed "John Moyle contest".

Closing date for entries is April 27th 1990. **ar**

## AWARDS

**KEN GOTT VK3AJU FEDERAL AWARDS MANAGER  
38A LANSOWNE RD ST KILDA 3183**

## WIA Awards Programme

Applications and enquiries about federal WIA awards should be addressed to Ken Gott VK3AJU, 38A Lansdowne Rd. St Kilda, Vic 3183. A SASE for reply is always appreciated when making an enquiry.

## General Rules For WIA Awards

**Cost** Free to WIA members. VK non-members pay \$A5 and others \$US5 or 8 IRCs. However, \$6 is payable by members for special event awards such as WIA 80 (see below).

**Verifications:** Applications must hold unaltered QSL cards for all QSOs claimed and these must show clearly the time, date, mode, frequency and signal report sent by the station concerned, and its location and/or address at the time. Alterations, even if made by the sender of the card, will disqualify the card.

Cards should not be sent with award applications. In their place, there should be a list of the cards in call sign order with the details set out in the previous paragraph listed in columns.

This list should be accompanied by a declaration signed by an official of a society affiliated with the WIA, or by two licensed amateurs, reading as follows "I/we certify that

(insert name and call sign of applicant) holds QSL cards corresponding to the above list and that I/we have personally inspected these cards."

Signatories of the declaration should clearly indicate their names, addresses and call signs.

## Applications

Applicants should indicate whether they are WIA members and if so cite their membership number. Where relevant, changes in call signs and the dates of such changes should be indicated. If the period of on-air activity covered in the application includes a change of QTH of more than 240 km, this should also be noted. If portable or mobile operations are involved, the station's locations should be indicated for each QSO.

Crossband and mixed mode contacts are not eligible, nor are those made through terrestrial repeaters, from aircraft or sea going vessels. Rules regarding changes of QTH during the period covered for an application vary for various awards.

Where a fee is payable, this should be sent with the award application.

In cases of dispute, the decision of the Federal Awards Manager and two officers of the WIA Federal Executive on the interpretation and application of these rules shall be final and binding. Notwithstanding anything to the contrary in these rules, the WIA Federal Council reserves the right to amend them when necessary.

## Awards Available

**Worked All VK Call Areas Award**

Known as "WAVKCA" this large, colourful certificate is the WIA's most popular award, particularly with overseas amateurs. There are separate requirements for local and overseas amateurs.

Locals require 77 QSOs, as follows: VK0, 3 from at least 2 different areas; VK1, 5 on at least 2 different bands; VK2, VK3, VK4, VK5, VK6, VK7— ten each, involving at least 3 different bands; VK8, 5 contacts and 2 bands; VK9, 4 QSOs from at least three areas.

The usual rules (see above) regarding crossband, mixed modes, mobile/portable, repeaters, etc, apply.

A past rule allowing VK applicants to make repeat contacts with the same station after 24 hours is hereby rescinded. No repeat contacts made after February 14, 1990, will count.

**Overseas amateurs** need one QSO with stations in each of VK0, VK1, VK8 and VK9, and three in each of VK2, VK3, VK4, VK5, VK6 and VK7, with no requirements as to bands or QTH.

**Heard All VK Call Areas**

This is a "heard only" version of the WAVKCA award, available to SWLs, on the same basis as to amateurs, ie confirm reception of 22 stations as specified if overseas, or 77 if resident in VK. The same fees and procedures apply.

**WIA DXCC Award**

This prestigious award is available to all amateurs who submit evidence of having worked 100 countries, and can be endorsed for various modes and bands. Holders are referred to as "members" of the DX Century Club.

Acceptable countries are determined by the Federal Awards Manager in consultation with the WIA Federal Council. In practice, the WIA list is the same as that issued by the ARRL, subject to the WIA reserving the right to make variations. Currently there are 321 countries on the list.

Having obtained the DXCC award, holders may register subsequent claims for higher totals and these will be published from time to time in Amateur Radio in the form of a ladder. No stickers to indicate these higher totals on certificates are available, however.

Having obtained the basic certificate, applications for recognition of higher totals should be made in multiples of 25 up to a total of 200 (ie at the 125, 150, 175 and 200 marks) and thereafter in multiples of 10 up to a total of 300. At that point applications for additions of single countries are in order.

Should a country be deleted from the DXCC list members and intending members of DXCC will be credited with such country if the date of contact was made before such deletion. Entries on the DXCC ladder typically show the member's tally of current countries and total of current and deleted countries, eg 200/220 — meaning 200 countries currently on the list and an extra 20 which have been deleted at some time, but which were worked before date of deletion.

Starting dates for new countries will generally be the same as those announced by the ARRL, with the WIA again reserving the right to make different decisions.

All claimed QSOs must have been made from the same DXCC country (This permits a shift from, say VK2 to VK4 during the period covered in an application, but not from VK2 to VK9 or VK0 — see DXCC list for the various DXCC "countries" within Australia.)

#### WIA Antarctic Award

This is the latest WIA award to be introduced and at present is the only regional award offered by the WIA (meaning that it involves contacts with stations outside Australian jurisdiction).

Applicants must make confirmed contacts with ten amateur stations conducting valid operations in Antarctica. The ten must include stations licensed by at least six different government authorities, and one must be a VK0.

Antarctica is defined as the land mass, including islands and permanent ice shelf below latitude 60 degrees south (This, incidentally, excludes Heard and Macquarie islands. These are sub-Antarctic, not Antarctic).

QSOs may be on any amateur band, including the WARC bands, but the usual terms on crossband contacts etc, apply.

QSOs must have been made after 0001 UTC, February 23, 1988. This date was chosen to mark the 75th anniversary of the first two way radio exchange between the Antarc-

tic continent and the world outside. On February 23, 1913, the exploration team led by the Australian geologist and explorer Douglas (later Sir Douglas) Mawson sent messages to the Australian Governor-General and to King George V from their base at Commonwealth Bay.

#### WIA 80 Award

This marks the 80th anniversary of the world's first and oldest national radio society, the WIA.

The award is open to all radio amateurs and shortwave listeners, and will operate from November 1st, 1989, until December 31st, 1990.

To qualify for the award those living in Australia (except VK9 and VK0) need to contact 80 members of the WIA.

All others need contact only eight WIA members.

Contacts through ground based repeaters are not permitted, although simplex contacts can be pre-arranged via repeaters.

Each WIA member worked on either the 30 metre, 17 metre and 12 metre bands will count as two contacts for the award.

For the contact to be valid, it must include the WIA membership number of the WIA member involved, and the number must be logged.

This number can either be the one which appears on the WIA membership certificate, or the six-digit number on the address label of the WIA journal, Amateur Radio magazine, sent each month to WIA members.

To claim the award, a log extract must be submitted that includes the call signs and membership numbers of the required number of WIA member contacts.

The cost is \$A5.00 for claimants in VK, P29, ZL and Oceania. All others submit \$US5.00, or eight IRCs. (This is the only current award for which WIA members are being charged a fee.)

Endorsements are being given for "first in Canada", "first in New York" and other countries and call areas, as well as for bands and modes.

#### Worked All States (Australia) Award

Contacts must be made on the VHF/UHF bands, 6 m and above. One QSL from each VK area, 1-8 inclusive, making a total of eight verifications. Endorsements for various bands and modes are available.

The same rules apply irrespective of whether the applicant is a VK or overseas amateur.

#### VHF Century Club Award

Issued to any VK or overseas amateur who has proof of contacts with 100 different stations on the VHF bands, at least seventy of which must be VKs. Contacts must be made on or after June 1, 1948.

Crossband and mixed mode contacts are not eligible, nor are ones via terrestrial repeat-

ers. QSOs involving mobile and portable stations are eligible, providing operators of such stations make all claimed QSOs from the same call area.

If an applicant moves to another call area, new contacts must be made from within a radius of 240 km of the previous location to qualify, otherwise a separate application must be made claiming only contacts made from the new QTH.

#### Worked All VK Call Areas (VHF) Award

Requires 22 QSOs on VHF bands as follows: one each from VK0, VK1, VK8 and VK9, three each from VK2, VK3, VK4, VK5, VK6 and VK7.

Contacts must have been made after January 1, 198, and rules regarding crossband, mixed mode, repeater, portable, mobile, etc, operations cited above in previous award rules apply.

In addition to the above federal WIA awards, there are scores of other awards offered by VK divisions, zones, clubs and special interest groups. These will be listed briefly in the next and following issues of AR.

New awards are constantly being launched by VK clubs and groups. These are reported regularly in the Awards Column in AR, along with news of new awards available from overseas amateur societies and groups and changes in the rules of the more popular existing overseas awards.

(To be continued in later issues.)

ar

## A Call to all Holders of a Novice Licence

Now you have joined the ranks of amateur radio, why not extend your activities?

The Wireless Institute of Australia (N.S.W. Division) conducts a Bridging Correspondence Course for the AOCPE and LAOCPE Examinations.

Throughout the Course, your papers are checked and commented upon to lead you to a successful conclusion.

For further details write to

The Course Supervisor  
WIA

PO Box 1066

Parramatta NSW 2124

(109 Wigram Street, Parramatta)

Phone: (02) 689 2417

11am to 2pm Monday to Friday  
7 to 9pm Wednesday

# REPEATERS

WILL MCGHIE VK6UU

21 WATERLOO CRESCENT LESMURDIE 6076

For years I have wanted someone to write a short column in Amateur Radio reflecting Repeater development and planning throughout Australia, but apart for a brief column written a few years ago by Ken Jewell and Peter Mill, Amateur Radio magazine has largely contained no such comment. Well, if AR will have me I am going to give it a go! I expect writing a regular column every month will be an arduous task, because to be successful it must be a long term commitment. Being involved with Repeaters for almost 20 years however I can see a lot to write about. Such a column could be the focus for communications between all Amateurs involved with Repeaters be they builders or users.

As Technical Officer for The West Australian Repeater Group input from other members within the Repeater Group would be sought along with comment from all Amateurs all round Australia. Packet Radio is a very powerful tool for input to a Repeater column and should be addressed to VK6UU @ VK6BBS. Even though my main interest is in Voice Repeaters, Digital Repeaters will also be included. My phone number is (09) 291 7165.

Strong support for FTAC and the WIA in Repeater co-ordination would be my intention. This is not to say that there won't be a difference of opinion from time to time. FTAC do an enormous job, often in a vacuum of input from Amateurs. Maybe this column can provide some of that input.

## Linking

Repeater Linking is the biggest change to Repeaters for many years. The technical means of achieving innovative linking must not be stifled by regulations that are insensitive to a developing technology. It is not an easy task to formulate regulations that must look into the future, but the importance of this futuristic outlook is crucial.

## Off Air Linking

Using one of the Repeaters to be linked as one end of the link between the two (or more) Repeaters, must be an option available to Repeater builders. To identify this means of linking the term OFF AIR LINKING has been coined. It may not be the best term, perhaps Direct Linking would be better, but the concept and versatility is important to understand. Several different types of OFF AIR LINKING are possible. The example to follow is the most versatile and the method most used by linked systems in operation at the moment. When cross band linking two Re-

peaters, placing a Transceiver at only one end of the link so it receives and transmits to the distant Repeater on its normal input-output frequency has many advantages. It is economical in terms of spectrum usage, cost and complexity. The most important of all these factors is complexity. One of the Repeater sites requires no extra equipment at all. An extra antenna, coax run, equipment space and power supply are not always possible on sites that are shared with other services. At the time of writing, OFF AIR LINKING is to be prohibited. The thinking on this option must be reversed. When planning a new Repeater system, simplicity is your number one aim, otherwise the project can be killed because the workload is too great. OFF AIR LINKING does not suit all types of linking situations such as in band linking, but it must be reconsidered.

The recent fine applied to the West Australian Repeater Group for operating a cross-band 70cm to 2m repeater, even though DOTC license such systems in VK4, leaves you to wonder what is fundamentally wrong? After much pondering of this planning nightmare, the only conclusion I have come to is that the problem is with us, the Amateurs. We must find a better crystal ball when formulating regulations. The present regulations on repeater linking were formulated by Amateurs and by-and-large rubber stamped by DOTC. The problem is these regulations contravene the principle code of practice for the Amateur service, that is to be innovative. As charged by DOTC our 70cm to 2m link contravenes the regulations in 3 ways.

1. Link frequency is not on its licensed frequency
2. Repeaters are cross linked contrary to licensing policy.
3. Retransmitting linked station identification contrary to licensing policy

Number 2 is strange and must be a mistake by DOTC

Number 1 is correct as the link is achieved by off air linking, and the sooner this becomes an option the better. The DOTC Officers I have spoken to see no problem with off air linking, particularly as it is spectrum efficient.

Number 3 is also correct as the system does not notch out the ident, but what is the problem? At times we seem to design systems for the lowest common denominator. Surely more than one ident on a repeater is not too much to handle.

The time has come to design repeater regulations that are farsighted. The Amateur at the bottom of this bureaucratic mess is the designer and builder, who often understands

the problems and solutions better than the rule makers but! and it is a big but, the bottom line is we the repeater designers and builders are to blame! It is no good blaming the WIA or DOTC. They do a very difficult job with at times little outside help. The WIA office-bearers are a group of dedicated Amateurs who have the prime responsibility of administration combined with providing a focus for discussion. When it comes to writing guidelines input from those concerned, and someone to actually write the guidelines is required.

Be aware of how the system works because this is very important. Comments like "We don't get on too well with the local WIA division so we miss out on information" is no answer. Our communication lines must be drastically improved. A national repeater organization within the WIA must come about. Even a position of repeater co-ordinator filled by someone who knows repeaters would be a great step forward.

It does seem to me that the innovative amongst us are penalized by unnecessary restrictions, and all in a time when we are told that deregulation is the word.

## Repeater Idents

Why are there Idents on Repeaters? Is it a DOTC requirement or a WIA requirement? From a repeater builder's point of view they just add a complication and an extra expense. A lot of a Repeater's control circuit is there not only to generate the Ident, but also to provide the correct timing and logic interface.

If the DOTC see Idents on Repeaters as necessary for identifying interference problems, I would like to know how often Idents help. To my knowledge, in VK6 the Ident on a Repeater has never contributed to solving interference problems. Identification is by the Amateur operators using call signs.

Don't get me wrong, Idents on Repeaters have a place. The point is it should be up to the Amateurs themselves to decide if they wish to personalize their Repeater. Situations such as two Repeaters on the same frequency that are often received due to enhanced conditions is one reason for having Idents.

## Idents On Links

If Idents are to remain, and Idents are not to be retransmitted on Repeater link systems, this creates a complication on how to remove the Ident. Yes it can be done. One such way is with an audio notch filter. The point is does it matter if Idents are retransmitted so that on a Repeater that is linked, you simply hear two Idents? These regulations have considerable effect on Repeater builders. Someone has to design and build all this circuitry.

The WIA is currently examining the question of Idents on Repeaters and link systems. My point is — leave it up to the Amateurs to decide if an Ident is required. **ar**

## POUNDING BRASS

GILBERT GRIFFITH VK3CQ  
7 CHURCH STREET BRIGHT 3741

Last month I mentioned a book called "MORSE CODE The Essential Language" by L Peter Carron Jr, who subsequently wrote to me to say that he is planning a new edition this year. About the new book he says, "The first three chapters will remain essentially the same. Chapter 4, "Learning to Receive and Send," will be expanded to include additional methods of learning, with expanded exercises. More Morse characters will be added to make a very comprehensive list of characters (even though all will not be in the learning exercises). Chapter 5, "High Speed Operation", will include a brief discussion on a modern computer/transceiver interface unit. These were just in their infancy when the book was first written. Chapter 7, "The Future", will be changed to "Advances in Morse Technology". It will include non-technical discussions on narrow IF and audio filters and advances in other modern day Morse equipment. A new chapter will be added on good CW operating practices and an extensive "Compendium of CW-Related Articles" will be included. Also, quite a few foreign versions of the Morse code will be listed. The appendix will include many updates and will be expanded to list new organizations and new computer code teaching aids. There will be a new "Author's Note" section that will discuss the long-standing code/no-code debate and the recent filing by the ARRL of a petition with the FCC for a no-code license. In short, the book will have many changes and additions. I'm very excited about it. The current edition just went over 8000 in sales, which isn't bad for a book on a subject that's supposed to be "dead".

## News From GB/ Europe

TONY SMITH G4FAI

"FOC, the First Class CW Operators' Club, has now joined the EUCW (European CW Association). All major UK and European CW clubs are now members of the association which exists to encourage and promote amateur CW operating. Nervous beginners to CW are reminded that the FISTS (?) Morse Club operates a "phone-a-sked" service for the benefit of all amateurs, not just members of the club. Those about to go on the air for the first time can obtain sympathetic help from an experienced operator who will gently steer them through their first QSO on the key. A list of these operators, with their telephone numbers, is available."

This seems such a good idea to me that I hope to set up a similar system here in Aus-

tralia. If you wish to help other budding Morsians on the air please write and tell me your name, call and phone. I will set up a database, probably regionally based, and then anybody can simply send me a SAE for a print-out of possible contacts for help.

Tony also reminded me about an article in the Autumn edition of *Morsum Magnificat*, "Kitchen Table — Home Made Key" by Barrie E Brokensha, ZS6AJY. I won't print the entire article because I am not sure of the copyright but using a piece of hacksaw blade, some curtain track, perspex and self-tappers, Barrie has made large quantities of these keys with appropriate audio oscillators for his pupils learning the code. The sharp point of the self-tapper has proven a reliable contact in place of normal silver or gold. Students sit around a table and make contact with each other using their sets, with all speaking prohibited. Barrie has promised them that when they are proud holders of their tickets and call signs, he will substitute the audio oscillator with a QRP RF oscillator, plug in a simple dipole antenna and let them loose on the bands!

The following letter comes from

GARETH DAVEY, VK2ANF

"About 10 years ago I was working as a technician at OTC's Coast Radio Station at La Perouse (VIS), and under test was a new Philips SITOR unit for radiotext contact with ships. (Back then, AMTOR was just a gleam in Syd VK2SG's eye.) Anyway tests were conducted on a variety of HF duplex frequencies, and it was not uncommon to have our shore-based receive frequencies jammed while working a ship. I don't know why they were jammed; perhaps someone out there didn't recognise the new-fangled SITOR signals and thought they were doing everyone a favour by interfering with them, or maybe they just wanted the test to fail. The Coast Station operators always blamed it on "the Russians" Russians or not, the jamming created a lot of problems for those 1st-generation SITOR signals, and it always fascinated me that Mr Philips included a switch on his unit marked TOR-CW, with a jack for a morse key on the back. One day while I passed by the SITOR console, one of the seasoned Coast Station operators was having a conversation with the morse key on the SITOR equipment. I had had an amateur licence for a few years and thought I could pick out signals from the mud, but no matter how hard I tried all I could hear on the speaker was a very loud, broad spectrum jamming signal. This operator though could actually read CW through the interference, and was discussing with his shipboard

counterpart what frequencies they would go to to try again an absolutely amazing demonstration of CW's maximisation of power/Hz, and the brain's ability as a bandpass filter."

By now many of you will have heard on the grape vine that we will have a new trophy for the Novice winner of the Novice Contest CW section each year. I have collected some donations toward the trophy which amount to \$100, and the WIA is going to put something toward the total so that the yearly interest will pay for a new trophy for each winner. Thanks to those who made donations, and to Bill Roper and the executive for their support of the code. The name of the trophy? "The Clive Burns Memorial."

If you wish to make a donation, please send it to Bill Roper at the federal office of the WIA. (Don't forget to tell him what it's for.)

Some months ago, George Crags, VK2AYG, sent me his Morse learning kit for a squiz. I would have liked to follow his advice and try it on six raw beginners, but here in the sticks it was hard to find one! I listened to the tapes and read the instructions and made an effort to try it on one of my kids, who are all interested, but have trouble finding the time, (as usual). The kit consists of four cassettes and an instruction/check book (not cheque), and is excellent if you have a slight knowledge of the code, or perhaps if you have not used the code for a number of years since getting your ticket. However for learning the letters you have to drill yourself from the printed page.

George's system has an advantage in that you are not required to write anything down, but I think actually learning the code from a more basic cassette is a required first step. If you think differently, or want to re-learn your forgotten code, have a go at this kit, it is extremely good for practice as well. George's address is 56 Oatley Park Ave, Oatley, NSW 2223. Write and let me know how you get on.

73 for this month.

AR

Have you advised the  
WIA  
Executive  
office  
of your new  
callsign?

Use the form on  
the reverse of the Amateur  
Radio address flysheet.

## AMSAT

MAURIE HOOPER VK5EA  
11 RICHLAND ROAD NEWTON 5074

**National Co-ordinator**  
Graham Ratchiff VK5AGR

### Information Nets

AMSAT Australia  
Control: VK5AGR  
Amateur check in: 0945 UTC Sunday  
Bulletin commences: 1000 UTC  
Primary frequency: 3.685 MHz  
Secondary frequency: 7.064 MHz

### AMSAT SW Pacific

2200 UTC Saturday, 14.282 MHz  
Participating stations and listeners are able to obtain basic orbital data including Keplerian elements from the AMSAT Australia net. This information is also included on some WIA Divisional Broadcasts.

## AMSAT Australia Newsletter & Computer Software

The excellent AMSAT Australia Newsletter is published monthly by Graham VK5AGR on behalf of AMSAT Australia and now has about 270 subscribers. Should you wish to subscribe, send a cheque for \$20 payable to AMSAT Australia addressed as follows:

AMSAT Australia, GPO Box 2141, Adelaide 5001.

The Newsletter provides the latest news items on all satellite activities and is a "must" for all those seriously interested in amateur satellites. Graham also provides a Software Service in respect to general satellite programs made available to him from various sources. To make use of this service, send Graham a blank formatted disk and a nominal donation of \$10 per item to AMSAT Australia together with sufficient funds to cover return postage. To obtain details of the programs available and other AMSAT Australia services send a SASE to Graham.

## Further Note On InstantTrack

Omitted from the notes given in the last issue, the author of the program Franklin Antonio N6NKF has "donated" it to AMSAT, so that all income from it goes towards future amateur satellites. In the case of copies distributed by AMSAT-Australia, 50 per cent is forwarded to AMSAT and the remainder retained by the VK organisation.

## ZRO Tests Via OSCAR 13

The ZRO Memorial Technical Achievement Award Program (ZRO test) has been reactivated in the last few months. Since the time schedules so far do not favour VK operators, please contact Graham VK5AGR if you wish to participate, so that he can negotiate with the organisers for a suitable time-slot.

This activity is a test of operating skill and equipment performance. During a typical ZRO run, a control station will send numeric code groups using CW at 10 wpm. At the beginning of the run, uplink power is set to match the general beacon downlink strength. This is level "zero". The control operator will send and repeat a random 5-digit number, then lower his uplink power by 3 dB (half power) and repeat the procedure with a new random number. This will continue to a level 27 dB below the beacon (level 9). A participating listener monitors the downlink signals until he can no longer copy the numbers. For further details of this activity, Graham can provide a brochure issued by the organisers.

## New JARL Satellite JAS-1b

Harry Yoneda JA1ANG advises the JAS-1b Launch Window to be 01 Feb 90 0125-0200 utc.

JAS-1b was built at the same time as Fuji-Oscar-12 as a backup, and has the same communications configuration. However there are some significant differences, which should allow it to provide a more reliable service than its predecessor.

Gallium Arsenide solar cells have been fitted, and since these have a much higher energy conversion efficiency to the silicon cells used on FO-12, the spacecraft will have about 11 watts of power generating capability at the start of its life. It is expected that with this capacity the CPU and memory will be able to run continuously, even with an eclipse rate of 33 per cent.

JAS-1b will be placed into a much different orbit to FO-12. It will be launched with OS-1b which is a Maritime Observation Satellite and is expected to be inserted into a sun-synchronous orbit with an inclination of 99 degrees and a period of 103 minutes (altitude 900 km). However, this orbit is eclipsed for 33 per cent of each orbit and consideration is being given to obtaining a more favourable period by raising the apogee of JAS-1b by about 300 km. This could be achieved by

## OSCAR 13 News

### Proposed operating schedules:

	31 Jan 90 - 21 Feb 90	22 Feb 90 - 27 Mar 90	28 Mar 90 - 09 May 90
Mode B	MA 000 to 160	MA 000 to 020	MA 000 to 160
Off	nil	MA 020 to 090	nil
Mode B		MA 090 to 160	
Mode JL	MA 160 to 190	MA 160 to 190	MA 160 to 190
Mode S	MA 190 to 200	MA 190 to 200	MA 190 to 200
Mode B	MA 200 to 255	MA 200 to 255	MA 200 to 255
Omnis	MA 235 to 75	MA 235 to 090	MA 235 to 075

### Proposed attitude changes:

22 Jan 90 to 210/2  
07 May 90 to 180/3

Eclipses: 27 Feb 90 to 21 Mar 90 between MA 31 and 65 from 13 to 89 minutes

## OSCAR 10 Attitude Prediction

JAMES MILLER G3RUH

Estimated attitude data for AMSAT OSCAR-10, extrapolated from last known attitude late 1986:

Date	Alon	Alat	Sa	Ill(%)	Slat	Slon
1989 Dec 10	41	-18	-19	95	-32	274
1990 Jan 7	38	-17	10	99	-45	305
1990 Feb 4	35	-15	38	79	-42	343
1990 Mar 4	32	-14	66	40	-27	10
1990 Apr 1	28	-12	84	11	-6	28
1990 Apr 29	25	-10	58	53	17	43
1990 May 27	21	-8	31	86	36	63

Please note that on OSCAR-10 the linear polarised OMNI antennas are in use and best signals are to be expected if the SQUINT angle is in the area of 90 degrees.

burning fuel remaining in the second stage of the H 1 launch vehicle after separation from MOS-1b. If this is achieved, the effect would be that about 150 days from launch the eclipse rate would drop so that from day 300 to 470 there would be no eclipses.

A further change from FO-12, is that the new satellite will use a ring type turnstile antenna for uplink receiving. This is expected to result in a more stable uplink signal received from ground stations. For transmitting, the digital and analogue systems will share the same antenna. This has resulted in the addition of a hybrid circuit (HYB) and phase shifters, instead of two antenna power dividers and two sets of transmitting antennas.

The specifications for JAS-1b and a schematic diagram are reproduced below.

73s from Maurice VK5EA

## Specifications of JAS-1b

### Launch And Orbit

#### 1 Launch (scheduled)

Time: February 1990, day is not fixed

Launch vehicle: H-1 (2-stage) rocket

Launch site: Tanegashima Space Centre, National Space Development Agency of Japan (NASDA)

#### 2 Orbit (planned)

slightly elliptical polar orbit, with 900 km perigee

Period: 106 minutes

Inclination: 99 degrees

### Satellite Specifications

#### 1 Dimension

Size: 26-face polyhedron measuring 440 mm across and 470 mm in height

Weight: Approx. 50 kg

#### 2 System configuration

Analog and digital transponder in mode J uplink 144 MHz, downlink 430 MHz)

#### 3 Attitude control

Satellite attitude will be maintained by using the torque generated by interaction of two permanent magnets with the earth's magnetic field

#### 4 Thermal control

Passive control using paint and thermal insulation

#### 5 Planned service life 3 years

### System Specifications

#### 1 Beacon and telemetry

JA beacon 435.795 MHz nominal frequency, ca 100 mW power, CW or PSK\*

JD telemetry 435.91 MHz nominal frequency, ca 1 W power, packet in PSK

\*Also capable of AO transmissions

#### 2 Telemetry

## Satellite Activity For September/October 1989

### 1. Launches

The following launching announcements have been received.

Int'l Number	Satellite	Date	Nation	Period min	App km	Prg km	Inc deg
1989 -							
077A	USA 46	Sep 25	USA	1413.4	35791	35774	5 0
078A	MOLNIYA 1-76	Sep 27	USSR	11h42m	38960	650	62 8
079A	COSMOS 2046	Sep 27	USSR	92.8	431	412	65.0
080A	INTER-COSMOS 24	Sep 28	USSR	115.9	2492	505	82 6
080B	MAGION 2	Oct 03	Czech	115.90	2494	504	82.5
081A	GORIZONT 19	Sep 28	USSR	23h54m	35753		1 3
082A	COSMOS 2047	Oct 03	USSR	89.5	357	178	67.2
083A	COSMOS 2048	Oct 17	USSR	89.4	270	248	62 8
084A	STS 34	Oct 18	USA	90.5	323	295	34.3
084B	GALILEO	Oct 18	USA	Jupiter probe			
085A	USA 47	Oct 21	USA				

### 2. Returns

During the period seventy six objects decayed including the following satellites -

1982-026A	COSMOS 1345	Sep 27
1982-121A	COSMOS 1427	Oct 05
1989-012A	COSMOS 2002	Oct 15
1989-075A	COSMOS 2044	Sep 29
1989-076A	COSMOS 2045	Oct 02
1989-084A	STS 34	Oct 23

### 3. Notes

1989-075A COSMOS 2044 with two monkeys and other objects landed 165km south of the town of Kustanay, USSR, on September 29 1989

1989-084B GALILEO was deployed from the orbiting STS 34 on October 18 1989

## Satellite Activity For October/November 1989

### 1. Launches

The following launching announcements have been received:-

Int'l Number	Satellite	Date	Nation	Period min	App km	Prg km	Inc deg
1989 -							
086A	METEOR 303	Oct 24	USSR	109.5	1228	1191	82.6
087A	INTELSAT 6A	Oct 27	ESA				
088A	COSMOS 2049	Nov 17	USSR				
089A	COBE	Nov 18	USA				
090A	STS 33	Nov 23	USA				

### 2. Returns

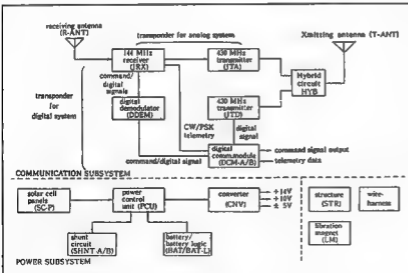
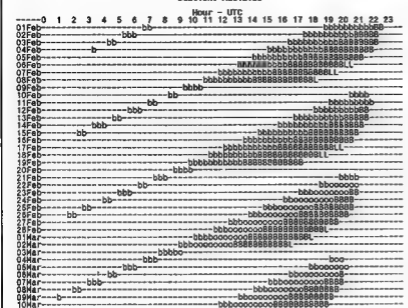
During the period seventy six objects decayed including the following satellites -

1966-067A	COSMOS 122	Nov 14
1967-039A	COSMOS 156	Oct 23
1978-119A	COSMOS 1064	Nov 12
1985-050A	COSMOS 1662	Nov 16
1989-082A	COSMOS 2047	Nov 21
1989-083A	COSMOS 2048	Oct 26

BOB ARNOLD VK3ZBB

# OSCAR-13 Schedule Schedule 01Feb90 to 10Mar90

Station: Adelaide



Block diagram of JAS-1b

**Remember**  
to leave a three second  
break between overs when  
using a repeater

**Support the WIA in  
order to protect  
amateur radio frequencies  
at WARC 92.**

- CW telemetry: 12 analog data items  
33 status items
- PSK telemetry: 29 analog data items  
33 status items
- 3. Commands: Equipped with real-time program command function.
- 4. Transponder  
Frequencies and modes (see the table below) are similar to those of FO-12. The analog system (JA) consists of an inverted heterodyne transponder, with a band width of 100 kHz operating with a mode J, of uplink 145 MHz and downlink 435 MHz.  
The digital system (JD) functions as a mail-box using the AX.25, link level protocol. Stations currently using FO-12 will be able to use JAS-1b without any modifications to equipment.
- (1) Analog system transponder inversely heterodyned linear translator, Uplink pass-band: 145.9 to 146.0 MHz  
Downlink pass-band: 435.9 to 436.8 MHz  
Transmitter output: Approx. 1W PEP  
Bandwidth: 100 kHz (3 dB bandwidth)  
Uplink EIRP required: About 100 W
- (2) Digital system transponder  
Store-and-forward packet communication, using AX.25 link level protocol, version 2.  
Uplink frequencies:  
145.85 MHz, 145.87 MHz, 145.89 MHz, 145.91 MHz  
Bi-phase Manchester code, on FM signal, with a bit rate of 1200 bps.  
Uplink EIRP required: About 100 W  
Downlink: 435.91 MHz/NRZ/PSK, 1200 bps.  
Transmitter output: About 1 W

- 5. Antennas  
144 MHz receiving antenna (R-ANT): Ring turnstile antenna mounted at bottom of side panels.  
435 MHz transmitting antenna (T-ANT): turnstile antenna mounted at the top of satellite (shared by analog and digital modes)

R-ANT:	polarization	gain
	circular	+0.5 dBi max.
T-ANT:	circular	+4 dBi max.

- 6. Power supply  
(1) Solar cells (planned)  
Cell Gallium arsenide  
Size and quantity: 2x2 sq-cm and 1x2 sq-cm, over 1300 cells  
Power output: More than 10 W, (BOL)
- (2) Battery  
Cell type and quantity: 11 series-connected NiCd cells (rectangular)  
Capacity: 6 AH
- (3) Voltage converter  
Bus voltage: +11 to 18 V (14 V average)  
Regulated voltages: +10 V, +5 V, -5 V  
Efficiency: Better than 70%
- (4) Power control functions  
Bus voltage upper limit control (full-shunt), and UVC function to disconnect load when battery terminal voltage drops

The above specifications were provided by courtesy of JARL. **ar**

## SPOTLIGHT ON SWLING

ROBIN L HARWOOD VK7RH  
52 CONNAUGHT CRES WEST LAUNCESTON 7250

Activity on HF became rather hectic in the third and fourth week of December, when two significant international events, suddenly erupted. The first one was the US invasion of Panama, in an attempt to capture military strongman, Manuel Noriega, and take him back to the States to answer drug-smuggling indictments. Relations between the US and the Panamanian military sharply deteriorated, following Noriega's annulment of the presidential election results last year, when his candidate was soundly trounced.

Noriega's thugs began harassing the substantial American population, who are mainly engaged in work around the Panama Canal Zone. There was also a sizeable US military contingent to protect the strategic gateway between the Pacific and Atlantic Oceans. The Americans acted swiftly and took most by surprise. The USAF frequencies of 8993 and 11179 kHz were carrying heavy traffic after the invasion commenced, as the transport aircraft ferried extra troops into Panama.

There are no external HF broadcasters in Panama, so I had to mainly rely on VOA and other international stations to catch up with events there. The major maritime station in Panama City — HPP did continue operating on 13.075 on ARQ, but went QRT two or three days after the invasion. The VOA in Washington came up unexpectedly in Spanish at about

the same time as the launching of the invasion, to explain why the US had intervened.

But it was the tragic events in Romania which pushed the Panamanian crisis into the background until after Christmas. The first inkling I had was a report on Radio Deutsche Welle of a massacre in a Romanian city I never knew existed, that alerted me to keep my ears tuned to news coming from the Balkans. Radio Bucharest has provided good signals to the Pacific at 0645 UTC on 15335 kHz for some time now, and I kept monitoring it. The programme output has been reflective of the personality cult that surrounded Nicolai Ceausescu and extremely boring. Yet when the revolution erupted violently, there was a swift, dramatic turn in the tone of the broadcasts. On Saturday December 22nd, the normal English output was suddenly replaced with multi-lingual appeals for help to put down resistance from the secret police. It was on a very poor-quality audio feed reflecting the uncertain situation at the time.

Several European broadcasters extended their Romanian language programming to cater for the need of listeners within that nation, as well as in the Moldavian Republic of the USSR (Moldavian and Romanian are the same language) to be kept informed of the momentous happening in Bucharest and Timisoara. The BBC came up on 15115 kHz on the

22nd at 1230 at 30 minutes notice

Then, on the 26th of December, came the English report about the execution of Ceausescu and his wife. The tone had changed in four days from praising him to the skies, to denouncing him as a tyrant equal to Hitler. Incidentally, I have yet to receive confirmation of my report to R.Bucharest in the middle of last year. I guess now with the substantial alterations within Romania, that a fresh report on signals and programming at present would be advisable.

Looking at the last quarter of 1989 in retrospect, we were witnesses to an epoch ending and a new dawn emerging as the artificial division of western and eastern Europe disintegrated. First, it was Radio Polonia, then Radio Berlin International, Radio Prague and finally Bucharest. All have altered their programming to accommodate the changed political climate. Also the World Service of Radio Moscow has brought details of the changes within the USSR over the same period. All these alterations have breathed fresh air into international radio.

I would advise that you keep an ear to the Baltic area and to the Nordic countries, for there could be significant developments over the next six months. Also, the central region of Latin America is likely to be the next flashpoint, with scheduled elections this month in Nicaragua. Managua has been heard in English floating around 6 MHz exactly around 0500 UTC. Well, that is all for February. Next month, I hope to be reviewing the 1990 World Radio TV Handbook. Until then, the very best of listening and 73

AR

## Prefix Changes

New prefixes are being used by some radio amateurs operating from within the USSR.

Estonia (UR) can use ES, Latvia (UQ) has been heard under YL, and Lithuania (UP) may now use LY.

AR

## DON'T BUY STOLEN EQUIPMENT

CHECK THE SERIAL NUMBER AGAINST THE WIA STOLEN EQUIPMENT REGISTER FIRST.

## ALARA

JOY COLLIS VK2EBX  
PO BOX 22 YEOVAL 2868

This year, for the first time, a DX-YL is winner of the ALARA Contest. Congratulations to Aume FK8FA for a great achievement. Congratulations also to the runner-up Bev VK6DE, and not least of all to our Florence McKenzie Trophy winner, Marjorie VK2VME.

Our thanks to all who participated and helped to make the 1989 Contest so enjoyable.

At the time of writing Marilyn VK3DMS is very busy preparing certificates for those who have won them. These will be despatched as soon as possible.

## ALARAMEET September 1990

With the holiday period behind us and most kids back at school (to the relief of their mums, who can now actually enjoy a quiet "cuppa") 1990 is well under way. Certainly not too soon to start planning for the ALARA MEET in Dubbo on September 29/30th. Or-

ganisation for this event is well in hand, and it promises to be a very enjoyable weekend. If you are considering joining us drop Maria VK5BMT a line for details.

## BYLARA

BYLARA have a new Secretary, Sandie GILXM and Newsletter Editor Kay GOKTC. They are interested in receiving any news items from overseas YLs for inclusion in the Newsletter.

### BYLARA Contest

This will be held on Thursday 22nd February, 1900 to 2200 UTC and Saturday 24th February, 1000 to 1300 UTC.

### Reminder: YL-OM Contest

Phone 10 2 90 1400 UTC to 12 2 90 0200 UTC  
CW 24 2 90 — 1400 UTC to 26 2 90 — 0200 UTC

## Alara Contest November 1989 Results

No	Callsign	Name	Points	Certificate
1	FK8FA	Aimee	964	Top overall & FK ALARA member.
2	VK6DE	Bev	705	Top Phone, VK ALARA member & VK6 ALARA member.
3	VK3CYL	Kim	682	VK3 ALARA member.
4	VK3KS	Mavis	673	
5	KB5HTH	Sue	371	USA non-member.
6	VE7YL	Elizabeth	339	VE ALARA member
7	G4EZI	Diana	315	G ALARA member.
8	VK2EBX	Joy	262	VK2 ALARA member
9	WA3HUP	Mary Ann	240	USA member.
10	VK6YF	Poppy	237	
	VK3DYL	Gwen	237	Tied Score.
11	VK7HD	Helene	231	VK7 ALARA member.
12	VK3DML	Margaret	222	
13	WB3CN	Ruthanna	154	
14	VK5BMT	Maria	152	VK5 ALARA member.
15	VK5CTY	Christine	149	
16	VK5YL	Denise	140	
17	DJ6US	Walli	131	European ALARA member
18	VK4AOE	Margaret	129	VK4 ALARA member
19	VK3DVT	Valda	119	
20	VK2VME	Margorie	116	Top Novice YL, VK Notice & Florence McKenzie Trophy.
21	VK3XF	Les	112	VK — OM
22	ZL1BIZ	Elva	107	ZL ALARA member.
23	VK5ANW	Jenny	106	
24	VK4VR	Val	104	
25	GOEIX	Rita	97	
26	ZM2AGX	Dawn	96	
27	DF28L	Anny	90	
28	L40018	Charles	84	Top SWL.
29	G4RFR	Jo	82	G non-member
30	VK7RY	Edgar	54	
31	VK3DYF	Bron	43	
32	YU7LF	San	28	European OM.
33	ZS2AA	Iris	26	ZS Non-member.
	VK3ALD	Len	25	Tied Score

Check logs received from:

VK3XB Ivor.

VK3DMS Marilyn.

## CLUB CORNER

MEG BOX VK5AOV SECRETARY  
BOX 401 BLACKWOOD 5051

On Saturday 25 November, 1989, the Adelaide Hills Amateur Radio Society conducted the first amateur radio examinations to be held by a body other than the Department of Transport and Communications

The following examinations were taken

6 Full Theory

3 Novice Theory

3 Regs

2 Receiving at 10 wpm

2 Receiving at 5 wpm

1 Sending at 10 wpm

1 Sending at 5 wpm

The club wishes to congratulate the 2 persons who gained their full theory — the only successful candidates on this occasion

These examinations were authorised for trial purposes under the new syllabus, which is not "official" until 21st February, 1990, and the Department will not issue a certificate or licence before that date.

Examinations Officer, Marshall Emm, reports that he was pleased with the way the examinations went and at this stage proposes that the next examination will be held on the first Saturday in March, 1990. Application forms may be obtained from the Secretary, AHARS Inc, Box 401 Blackwood 5051 and should be returned no later than 2 weeks before the examination date. The fee is \$10 for non-members (no matter how many exams sat for on the day), and free for members. Note. Membership of AHARS is \$10 pa at present.

## Monty Nell And VK2JQ Remembered

D S THOMPSON VK2BDT

Members of Goulburn Amateur Radio Society were delighted when advice was received from the Department of Transport and Communications that they had been authorised to use the call sign VK2JQ for their Club station. The call sign is of great significance as it was the one used by the late Monty Nell who was the Patron of the Society for many years before he became a "silent key" in mid 1989. The Society thought that it would be a fitting manner in which to preserve the memory of Monty and his contribution to the hobby of "ham radio".

Monty Nell was a very keen amateur operator, he was first licenced in the early 1920's, when his call sign was OA2JQ, Australian "hams" later had VK as the prefix to their call signs denoting that they were Australian stations. VK2JQ has been held continuously

## Here And There

Nancy VK2NPG and OM Dale, currently touring Australia, attended the VK5 Division Christmas Party while in Adelaide. They were late arriving due to car trouble, but had a great time once they finally arrived

Val VK4VR represented ALARA at the Gold Coast Hamfest late last year.

Errata from last month's ALARA News: Clarrie VK3UE has been an amateur radio operator for 41 years, and Joyce VK2MI for 42 years, not 40

Until next month,  
73/33.

BF

Help  
stamp out stolen  
equipment -

Always include  
the serial number  
of your equipment  
in your Hamad



elled in more than 100 countries and worked amateurs throughout the entire world. The date of this QSL was November 1967 when the country was still called Dahomey. It resulted from a QSO by the late Alex Swinton, VK2AAK (VK3AAP) whose widow, Mona, VK3BRE kindly donated Alex's QSLs to the collection. The QTH of the Dahomey station was Cotonou. This city, situated only about twenty kilometres from the capital, is the country's largest and also its chief port.

## TY0LC

The special prefix TY0 is a comparatively new one. This QSL dated May 1988, resulted from a QSO between DX-er Jim Smith VK9NS (on Norfolk Is) and Jean-Louis Pipien. It is an especially assigned call since the suffix LC stands for "Lions Club". The Lions International was holding at this time their VIIth Congress under the patronage of the President of the Republic. Their thanks to both the President and the Beninese authorities are expressed (in French) on the front of the QSL card. French (the country's official language) is almost the only European language spoken these days, English being quite uncommon. Even today, the country is very dependent upon the investment of French capital into the economy.

## TY9ER

This QSL also resulted from a DXpedition, this time by Ed Richmond W4MGN. The station situated also in Cotonou, was on the air from 10-13 July 1980. Ed mentions that the pile-ups were horrendous and we can appreciate the reason why. Over 2000 contacts were made on 10, 16, and 20 metres during that short period. The QSL recipient was another top DXer, Barry VK5BS whilst operating mobile in Queensland.

If you like to play a part in building up the WIA QSL collection and to save something for the future, would you please send a half-dozen (more if you can spare them) QSLs which you feel would really help the collection along.


All cards are appreciated, but we especially need commemorative QSLs, special event stations QSLs, especially assigned call QSLs (eg VK4RAN), pre-war QSLs, unusual prefixes, rare DX and pictorial QSLs of not so common countries. Could you help? Send to PO Box 1, Seville 3199, or phone (059) 643721 for card pick-up or consignment arrangements for large quantities of cards.

## Thanks

The WIA would like to thank the following for the kind donation of QSL cards (Supplementary List):

Vic VK5AGX Arthur VK3VQ  
Frank VK2QL Bruce VK3BM  
Jim VK9NS Jack VK3JA

*Greetings from* **BENIN** ZONE 35 AFRICA




**TY9ER**


DX-PEDITION

QSO WITH <i>VK5BS/VK4</i>	DATE <i>JULY 13 1980</i>	GATE <i>0740</i>	MHz <i>14</i>	EST <i>53</i>	T-WAY <i>SSB</i>
------------------------------	-----------------------------	---------------------	------------------	------------------	---------------------

Guest Operator: **ED RICHMOND, W4MGN**  
 QSL Manager for this operation only:  
**BOB SCHENCK, N800**  
 P. O. BOX 343  
 TUCKERTON, NEW JERSEY 08067, USA  
 Regular QSL Manager - DLSDC



QSL evidence by



(verified by)

"Ike" VK30W Stan VK3TE  
Also the South African Radio League (SARL)

## Congratulations

The Wireless Institute of Australia congratulates well-known DX-er Robin Lyon, VK6LK of Margaret River, WA as the winner of the 1989 DX QSL Contributors' competition. We feel he deserves this praise since he has remained at the top of the list for most of 1989 with some very generous (and rare) QSL contributions. Robin is to be awarded a suitable inscribed memento by the WIA in appreciation of his fine effort.

## DX QSL Contributors' ladder

(See "Amateur Radio" March 1989, page 55 for details.)

As stated in the December issue of "Amateur Radio", we have started a "new" ladder from Jan 1990. Those top DXers Jim Smith, VK9NS and Frank VK2QL have shot to the front of the field in no mean way with truly excellent QSLs. Despite the fact that it is becoming rather difficult to add to the WIA's prefixes, Jim sent in no fewer than 31 prefixes from quite rare DX spots together with 48 recently-issued Stateside prefixes that were new to the collection. It was a very fine effort. Old Timer, Frank VK2QL not only supplied some excellent prefixes, but also a few countries new to the collection including the rare (now deleted) country, Ifni

## Contributions

From Jim VK9NS- AZ4F (Argentina) AZ5ZA (South Orkneys) FH4 (Mayotte) FJ (Saint Martin) FP5, FR5, FS9, FW4, S92 (St

Tome), WH8, V3, TY0, J39, J37, J27 (Djoubouti), IY4, I04, HT5, NH4 (Midway), RD7, 4V2 (Haiti), 3G87PAX (Chile), RX4, P36, (Cyprus), 8P9, 802, 6W8, 6V6, 6V2 (Senegal) 6F2 (Mexico) 6T0, together with no fewer than 48 newly-issued (one letter suffix) Stateside call signs.

From Frank, VK2QL- Geyser Reef, Ifni and Bouvet Island (LH4C) JX2, 6V0, NG0, KF3AB (Fletcher Ice Island), KG61, P46, P23, YR4, YQ4, UY4, W3SKY (Skylab), SW0, XL1, W16ITU, 4C5 (Mexico), 4U2ITU, KE4, KL6ITU, 8SM0, XJ2, Special Calls include: LZ5A, N6V, 8J1ITU, 8J1AD (Antarctica), R0C, U0Y, 3Z50PEK, 4N2BR, YU7LAA, HB1KU/HE, W08ITU.

From Bruce, VK3BM- YN8, 4A0, 3C8, HC3, CW0, Special Calls: 11HC, DL0WU, W0S0UB/0 (Submarine Call).

From Vic, VK5AGX- NR1, W8, NC8, Special Calls: JA7RL (JARL), GB75LOA

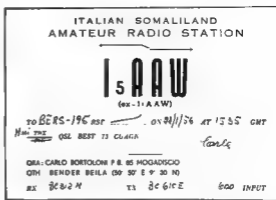
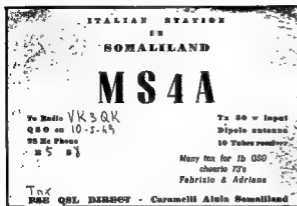
## Present State Of The Ladder

Jim	VK9NS	156 points
Frank	VK2QL	149
Ray	VK3RF	24
Bruce	VK3BM	13
Barry	VK5BS	10
Vic	VK5AGX	8

This must be regarded as a pretty good effort when one considers that the WIA Collection must be one of the largest collection of prefixes in the world. It is no easy task to add to it.

Please do not forget that information on QSLs, DXpeditions and the like is available upon request from the curator. Also photostat copies of both pre-war and modern QSLs are available free of charge to any writer on the history of amateur radio.

In the January 1990 issue, Murphy decided that it was time to give Ken Matchett VK3TL some attention by eliminating the entire illustrations from his QSL article! (Which, believe it or not, survived three proof-reading sessions!) Our apologies to Ken. The missing illustrations are shown below.



## EDUCATION NOTES

BRENDA EDMONDS VK3KT FEDERAL EDUCATION CO-ORDINATOR  
PO Box 565 Mt WAVERLEY 3149

Information about the exam generation system is starting to accumulate. Papers produced using the program have been successfully used as actual examinations in VKS. A few people have passed on comments on the papers produced on a trial basis, and I have used the program to generate two papers from each bank. I would appreciate any more comments or information as it becomes available. Unless anyone feels strongly against sharing their findings, I will try to pass on information as it reaches me.

The generation program at present does not seem to me to be the complete answer (I do not think it was intended to be.) It is obvious that each paper will require some degree of editing. The diagrams are not included on the disc, so will have to be patched in. More importantly, some questions may have to be replaced either because one may inadvertently answer the other, or because there are too many from a particular subsection. No formula seems to have been applied to decide the spread of questions from within any particular section, so the distribution reflects the number of questions on each topic in the bank. As I have said before, it will be to our advantage if we can produce extra questions to be added to the bank to even out this distribution.

I have not yet had a chance to try the editing on the computer. It should not be difficult to replace an existing question with one from the bank, or to make minor alterations to a question. I hope it is also possible to

alter the order of the questions, as at present each paper is produced with the questions in the order in which they occur in the bank. I think re-arrangement might have to be done manually.

I do not recommend trying to produce papers in a hurry. I have not yet tried to measure the time it will take to produce a satisfactory paper. It will depend to some

extent on the operator's skill of course, but each Theory paper I ran took about 12 pages of printing without any spaces for diagrams. At a very rough estimate, I would expect to spend an hour reading a paper and deciding modifications needed, (there are a few typographical errors which will need to be amended), up to an hour making the modifications, and another hour putting in diagrams and photocopying.

The exams this month will be "the end of an era". For the last time I can wish a large group of candidates luck and success. Remember, READ THE QUESTION, and ALL the answers. I look forward to hearing you on air in the future. ar

## Morseword No 35

Solution on page 61

### Across

- 1 Namely
- 2 Headgear
- 3 Brand of computer
- 4 Close tightly
- 5 Picture
- 6 Chant
- 7 Cabbage
- 8 Begin
- 9 Agreements
- 10 Performance

### Down

- 1 Shakespearian king
- 2 Comforts
- 3 Admonish
- 4 A small drink
- 5 Suits
- 6 Carried
- 7 Arid
- 8 Abbot
- 9 Successes
- 10 Sprinkle

	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Audrey Ryan © 1989

## DIVISIONAL NOTES

### VK2 NOTES

TIM MILLS VK2ZTM

## Newcastle Earthquake

Just before 10.30 on Thursday 28th December, much of VK2 felt the shake. Much of Newcastle, in particular the Central Business District and surrounding suburbs bore the worst of it. Large areas lost power or had it turned off, and most communications went out. Within a few minutes the local Amateurs were activated. Links out of the area were established. Within a couple of days additional personnel were brought in from outside the Newcastle region to relieve the locals as well as provide additional facilities. The Amateur operation was maintained for almost a week.

A more detailed report will appear in later issues of "Amateur Radio", but at this stage thanks must go to the Amateurs and WICEN personnel who were involved.

## 1990 Annual General Meeting

It is getting round to that time again for the annual election of Council and the Annual General Meeting. Reports should be submitted to the Secretary by mid February, and those interested in serving on Council should obtain a nomination form for the office.

## Field Days

You are reminded that the Central Coast ARC field day will be held at the Gosford Showground on Sunday 18th February. Details of the program may be heard on the Divisional broadcasts. Please note there is no morning broadcast on the 18th. Instead it will be held on Saturday evening the 17th. The Sunday evening will be held as usual.

The Urunga Convention will be held over the Easter weekend in April, and details should appear in Club Corner in a future issue. The Oxley Region Field Day is over the long weekend in June.

## Joint Meeting

A joint meeting of the Presidents of VK2, 3 and 4 was held in Sydney in the break between Christmas and New Year. Many subjects were covered and it is hoped that they may become a regular feature. While there are the inter Divisional meetings at the Federal level, the discussions are more often

national rather than State matters.

Club Members should be aware of proposed changes in regional representation via the affiliated club structure. If not, ask to see the recent QST postings if a copy has been included in your local club newsletter.

## Divisional Office Fax

A dedicated line has been installed for the fax in the office (02) 633 1525. It is on line at all times. Why not use it for general inquiries, broadcast items, bookshop inquiries etc.

## ATV Meeting

You may have noted the report from the Sydney ATV Group in last month's "AR". There are a lot of pockets of ATV interest in VK2. Several groups have had repeater licences, including, Taree, Newcastle, Central Coast, Gladstone, Sydney and Wagga. It has been suggested that a meeting be convened for all interested parties to get together and discuss and plan future activities, including the best utilization of available frequencies. An error in the callbook left out details of most of the ATV repeaters which may lead some to think there is little or no VK2 activity. This meeting is expected during February.

## February Exam

The best of luck and good wishes to all who will be sitting the last DOTC exam on February the 20th. After that date all (except certain special) exams will be conducted by the Amateur Radio Service. For details within VK2 contact Terry VK2UX, the Divisional Education Officer, via the office for details of groups conducting exams or to tell him if your group will be conducting them.

## Technical Tapes

Before each Sunday broadcast there is a quarter hour technical segment. Requests are received from time to time for copies or transcripts. Copies of the tapes are available if requested through the office. There is a small charge to cover tape and delivery costs. While on the subject of technical matters? or how not to use 3 pin plugs and sockets for extra low voltage, there is a 2 pin system made by the various companies in the electrical field. It is the "T" plug, designed for "extra low voltage". Many of you will know it and several use them. The question I wish to put to you is the following: "What is the correct or preferred polarity to wire it?" There is no standard set

out as far as I am aware, but because there are two ways (or is it more?) of wiring it up, there are often problems of reversed polarities, which has about the same effect on a rig as 240, if there is no reverse polarity protection. So which of the layouts below is the preferred or more common? Written replies to "Plug Polarity" PO Box 1066 Parramatta NSW 2124.



## New Members

The December intake of new members was the largest for some time and a warm welcome is extended to all

R W Allsopp	Assoc	Balgowah
D S Bird	Assoc	Terry Hills
M J Blackmore	VK2XOF	Baulkham Hills
G R Brice	VK2GRB	Thornleigh
W F Brittain	Assoc	Wahroonga
S J Burgess	Assoc	Cherrybrook
G Cotterell	Assoc	Gordon
G R Dalglough	Assoc	Pictou
G B Dent	Assoc	Tamworth
T Florio	Assoc	Macquarie Centre
C H Gibbons	VK2MHR	Austinmer
J A Green	VK2PJG	Bray Park
P J Hollis-Watts	VK2YJW	Raymond Terrace
R Harrison	VK2ZTB	Balmain
A K Hore	VK2TQB	Goonellabah
E Horman	VK2KEL	Auburn
S J Jacobs	Assoc	Narrabeen
W R Knowles	VK2DJE	Gulburra Beach
L H Kocken	Assoc	Castle Hill
A Luckman	Assoc	Ryde
R P McKeon	VK2DOT	Niagara Park
R J Obra	Assoc	Parramatta
C Pradier	Assoc	Albury
W Rannard	VK2YKZ	Georges Hall
R Raven	Assoc	Tathra
C E Rowell	Assoc	Cremorne
A Runiewicz	Assoc	Auburn
S Scott	VK2FUB	Monisset Park
L Seidl	Assoc	Carlton
B B Singh	Assoc	Herbersham
R K Sommerville	VK2URK	Woodburn
J D Stewart	VK2MHU	Wagga Wagga
N J Stewart	VK2GS	Landfield
D M Stocks	VK2ZDS	Toongabbie
J Szabowski	VK2XJJ	Kingswood
S Szabowski	VK2KEU	St Marys
J Wyalace	Assoc	Caringbah
M J Walton	Assoc	Horneby
O Zacovich	VK2DKR	Tempe

## VK2 WICEN NEWS

MORTON WILLIAMS VK2DEX

### Bungonia Exercise

WICEN (NSW) Inc wishes to advise that the simulated cave rescue exercise for 1990, will be held as usual at the Bungonia caves on the second weekend in March, which, this year, is the 10 — 11 March.

Wicen's primary role in this exercise is to provide a safety net during the simulated cave rescue operations.

All meals are provided for a modest cost to operators to provide an enjoyable weekend, free from camp cooking.

If you are interested, contact Morton Williams, VK2DEX QTHR, or on the Sydney Wicen net on Thursday nights at 2100 local time on channel 7150 or 8276, before 1st March, as numbers must be known by then for catering purposes. ar

## VK3 NOTES

JIM LINTON VK3PC

### VK3BWI Weekly Broadcast

The aim of the broadcast, which starts at 10.30am each Sunday, (see WIA directory page 3 for frequencies) is to inform listeners of events, happenings and issues affecting our hobby. It has hundreds of regular listeners and is one of the media used by the WIA Victorian Division to communicate with its members. The broadcast has news items, editorial comment, reports of events and issues. Regular listeners will be aware it also has occasional items of a controversial nature, and a sprinkling of humour, trivia, and amusement.

The forward looking broadcast team late last year gave thought to how the broadcast could be improved on its already successful format. Two new segments were chosen and expected to begin this month. The first is a report on Amateur Television activity to be supplied by Melbourne ATVer Doug White VK3BOW. The other innovation for the broadcast is plain-language ionospheric predictions which will be of use to the casual or ardent user of the amateur HF bands.

### Reference Library

After considerable effort, the Division's library has now been placed in new bookshelves. It is not a borrowing library, but



*Amidst the neat bookshelves in the WIA Vic Div reference library is Ken Matchett VK3TL showing obvious and deserved pride in re-establishing the library.*

exists as a reference library and membership service.

Among the periodicals held by the library is a complete set of Amateur Radio magazine from 1933. Other magazines include QST from 1926, CQ from 1950, RSGB Radio Communication, Electronics Australia (formerly Radio and Hobbies), 73 Magazine, Amateur Radio Action, Wireless World, Ham Radio, and NZART Break In. Also held is an incomplete set of ARRL Handbooks over the past 60 years, and the RSGB Handbooks. Those wishing to trace old callsigns will find the callbook collection a help. Several historical textbooks — Admiralty Handbooks, and Yearbooks of Wireless Telegraphy — give a glimpse into the early days of wireless. Members are most welcome to use the library for research, and a photocopying service is available at a nominal charge. The WIA Victorian Division Council expresses its appreciation to Ken Matchett VK3TL for his efforts in re-establishing the library. ar

## 5/8 WAVE

JENNIFER WARRINGTON VK5ANW

Last month, you may remember, I gave you some of the history of VK5WI and the Sunday Morning Broadcasts, 40 metres in particular. I suppose that it goes without saying that without volunteers there would be no Sunday morning Broadcasts. Chris VK5PN who coordinates the volunteers roster informs me that things are getting pretty desperate on some frequencies. On 20m in particular, there could be some weeks when there is no relay, simply because of the lack of volunteers. If we could get 4 operators on each frequency each would only have to do it once a month — 18

that such a great hardship? I believe that Jack VK5AHI has been a great help this year helping out on various HF bands, when needed.

6m (53 1 AM) has just lost two of its long time stalwarts. Lance VK5ZBC has done 165 relays since he started in 1981, and I don't know how many Andrew VK5AAS has done, but I know that he also has been doing it for many years. Our grateful thanks go to both of you for all the time and effort you have put in. I understand that we have one replacement on that band, our thanks to Bob VK5KZZ who has volunteered.

10m is looking "healthier" than it has for sometime thanks to Reg VK5RR who has volunteered to help VK5a UH, AH, and BAR. You might remember that last month I mentioned that Reg VK5RR was doing the Sunday morning B/Cast in March 1947! (Perhaps this will give some other former operators the incentive to return.)

Perhaps you would prefer to put on the originating Broadcasts from the BGB. There are currently six operators who do this, but as Clarry VK5KL said on the 160m report this year, some of the are not as young as they were and it would be nice to get some "new blood" on the team. 80m would also like to see some new faces but if you would like to volunteer for ANY band, please let Chris VK5PN or a member of Council know — you will be welcomed with open arms!

To those volunteers who are already doing a great job, there isn't room to mention you all, but we thank you sincerely none-the-less.

One volunteer who always seems to be there when help is needed is John VK5NX. Here are just a few of the jobs John does. He is a B/Cast Relay Operator on 80m, he is one of our Auctioneers at Buy and Sell nights, and he is "Technician in Charge" of the radios and tape recorder for the broadcasts, in the transmitter room. For many years John has organised the drinks for the Picnic and Christmas Social, and has helped organise the races for the kids etc. Four times a year he makes sure that we receive the ICS Award at the right time, and has at times been Guest Speaker, and Judge of homebrew gear when we have needed one. This doesn't include his time on Council when he was Treasurer for several years.

John will be retiring later this year, so he may not always be around when we need him, with this in mind, we felt that it was a good time to say "thank you" to John by awarding him the ICS Award at the December meeting. Thanks John, it's not going to be easy to fill your shoes!

## Diary Dates

Feb 27th Ian Hunt VK5QX will speak on "Mobile Installations"

16 - 18 March Clubs' Convention at Ridge Haven Primary School (Hopefully by now we have all our Agenda Items and names of delegates!) ar

## VK6 NOTES

JOHN HOWLETT VK6ATA

Club Conference has been arranged by the Peel AR group and is destined to take place on the 17th February at a site some 30 km South of Mandurah. It has been a few years since the last meeting and should be an interesting weekend. Some WIA council members will attend so get ready with suggestions and questions you always wanted to ask.

Equipment Bank is being set up as a service to all WIA members and will come on stream soon. A secure cabinet has been built by Doug VK6ASM at NCRG Club shack, and is being stocked up with common pieces of test gear to start the project moving. Equipment can be borrowed before and after the Sunday morning news relay, or at NCRG Club meeting held on the 2nd and 4th Tuesday of each month. Commencement of the service will be announced on the news broadcast and represents another tangible reason to renew your WIA membership and support those who support you.

Intruder Watch Graham VK6RO recently became WA Co-ordinator and deserves our congratulations but even more, Graham needs information on intruders. A cassette tape is available to help you identify the many strange sounds heard on the bands, some of which are not intruders but amateur computer driven modes. Learn the difference and expand your knowledge of the hobby. SWLs are most welcome, contact Graham on (09) 451 3681 for the full story.

Under 21 Club: rumour has it that a net is being organised by some of the younger operators and sounds like a great idea. We look forward to more news on this in the near future.

New Year Resolution. why not try a new aspect of the hobby this year? Perhaps fox hunting, send some CW, join 10-10, work towards DXCC or chase an award. Learn about packet, AMTOR or Satellite Communications. Work a contest, build a kit or homebrew a project. Above all, be active on air and occupy the valuable air space we all take for granted. 73

## Notice Of AGM

It is hereby notified that the Annual General Meeting of the Western Australian Division of the Wireless Institute of Australia will be held on the 17th April 1990 following the General Meeting which commences at 8pm. The Meeting will be held at the Westrail Centre, East Perth

### Agenda

1. Consideration of the Council's Annual Report
2. Consideration of the Financial Report

3. Consideration of other Reports
4. Election of Office Bearers, viz. President and Vice President of the Division and seven other Councillors.
5. Election of two Auditors.
6. Appointment of a Patron
7. General Business which has been duly notified.

Notices of motion for the AGM must be received by the Secretary not less than 42 days prior to the meeting and must be signed by at least three members.

Nomination of a candidate for election to Council must be received by the Secretary in writing not less than 42 days prior to the meeting with an intimation that such candidates are willing to act. A candidate may submit a statement not exceeding two hundred words outlining his or her case for election and experience. Each nomination shall be signed by two members proposing the candidate. Candidates must possess a current amateur licence.

### Proxies

Any financial member entitled to vote may appoint a proxy, who must also be a financial member entitled to vote, to speak and vote on his/her behalf. Each such proxy must be in the hands of the Secretary prior to the meeting and be in the following form:-

I, ....., a member of the Institute hereby appoint ..... also a member of the Institute to act for me as my proxy and in my name to do all things which I myself being present could do at the meeting of the Institute held on

Signed .....

Witness .....

Date ..... ar

## INTRUDER WATCH

GORDON LOVEDAY VK4KAL FEDERAL INTRUDER WATCH CO-ORDINATOR  
AIRMORE RUEVLA 4702

So to the second instalment of the Monitoring Lessons...

All modulated or keyed signals occupy a finite bandwidth, some choice is offered in designating the frequency of emission. In some cases the choice is obvious, in others it is more arbitrary. Reference should be made to the following table to ensure uniformity in Monitoring System reports. I will take the most encountered signals first.

1. NON Measure freq @ zero beat in CW or SSB mode
2. PON Measure Centre frequency of the Emission
3. A1A Zero beat in CW or SSB Mode
4. A2A Zero beat of Carrier in CW or SSB Mode
5. F1B Centre freq of Emission ie half between the zero beat of the two Carriers
6. F7B Centre freq of 4 carriers, sounds like 2 equally strong

## VK7 AGM

J A ROGERS VK7JK

The Annual General Meeting of the Tasmanian Division of the Wireless Institute of Australia will take place on March 24th 1990 at a venue to be notified later on the Divisional Broadcast. In order to ensure circulation of Notices of Motion to all members, these must be in the hands of the Divisional Secretary at PO Box 1010, Launceston, 7250 by the 9th February, 1990. Nomination Forms for Council must be submitted to the same address by the 3rd March.

Both Nominations and Notices of Motion must be in writing

Proxy Forms should be in the hands of the Secretary prior to the commencement of the meeting

Northern Branch Annual General Meeting is to be held on the 14th March 1990. The venue for this meeting is also to be advised later.

Nominations for Branch positions close the day before the meeting, ie the 13th March.

The Annual General Meeting of the Southern Branch of the Tasmanian Division of the Wireless Institute of Australia will take place on the first Wednesday in February - that is, the 7th at 105, Newtown Road, Hobart at 8.15 pm.

The Annual General Meeting of the North Western Branch of the Tasmanian Division of the Wireless Institute of Australia will be held on 13th February

The venue will be the Penguin Hotel and the time, 7.30 pm. ar

7. J3E RTTY signals close together Resolution frequency of the modulation

These modes are featured on the monitoring service tape available from your National Co-ord at NO charge - a C60 cassette is sufficient. Many other modes will be included on the tape. More modes will be described next month, with explanations. It is not appropriate to dictate absolute standards here, because the equipment in use by monitoring stations varies. Recommendation 7 (D) of an IARU Region 1 Div Conference states "For frequency measurement made solely to investigate the occupancy of frequency channels, the permissible error as applied to exclusive Amateur Bands be  $\pm 210\text{Hz}$  @ 7 MHz,  $\pm 420\text{Hz}$  @ 14MHz  $\pm 630\text{Hz}$  @ 21MHz &  $\pm 840\text{Hz}$  @ 28MHz". These remarks should be kept in mind when making frequency measurements. Extracts used are by permission of IARU monitoring system. ar

## SILENT KEYS

We regret to announce the recent passing of

Mr J F Magee	VK1FM
Mr E H Cox	VK1GU
Mr A T W Griffiths	VK2FO
Mr P C Smith	VK2DNE
Mr A D Costello	VK3YT
Mrs J L Sutherland	VK3NLO
Mr Jonathan Marshall	VK3KPQ
Mr I C Truelove	VK8AP

## Jonathan Marshall VK3KPQ

Jonathan (19) was driving home on Thursday 7th December, when his car left the Hume Highway and struck a tree. He had been playing his part over the previous four days with WICEN providing communications for the Great Victorian Bike Ride.

Jonathan was a likeable, enthusiastic teenager whose love of amateur radio was contagious; it was part of his life. Over the last few years he did his best to enthuse other youngsters with his involvement in the Jamboree On The Air.

He was conscientious and honourable, once he had committed himself he could be depended upon, and he was generous to a fault with both his time and equipment.

Last year Jonathan spent a year in Israel on a scholarship for leadership training. Since his return he has been deeply involved in helping to bring the best out in other young people, as well as continuing with his studies.

We grieve with his mother, father and two sisters, and all those who knew him, at his most untimely death.

ALAN WEEKS, VK3CAW  
VK3SCM, MALVERN DISTRICT SCOUTS

## REPEATERS

- ADDITIONS,
- DELETIONS,
- ALTERATIONS.

**HAVE YOU ADVISED  
THE WIA OF  
CHANGES NEEDED  
TO THE REPEATER LIST?**

## OVER TO YOU

ALL LETTERS FROM MEMBERS WILL BE CONSIDERED FOR PUBLICATION AND SHOULD BE LESS THAN 200 WORDS.

THE WIA ACCEPTS NO RESPONSIBILITY FOR OPINIONS

\*\*\*\*\*

## Membership In The "Nineties" "To Be or Not To Be ..."

I have read with interest and some degree of consternation over the past twelve months or so, the various letters concerning the continuing increase in the cost of WIA membership.

I had no intention of taking part in the discussion, but the introduction of the WIA 80 Competition, "I am a member of the WIA because", has prompted me to consider and evaluate my own reasons for being a WIA member. All too often writers have taken a negative stance, being "concerned" with the cost while high-lighting how few benefits are available to them. Very rarely do these writers contribute anything worthwhile and any positive aspects seem to be deliberately overlooked.

The only negative aspect I wish to bring forward is to comment on how pathetic the afore-said arguments are when held up to honest scrutiny. Even the current cost of \$65 is really minuscule when compared with the benefits available to members. I say available because they are there, whether or not we need to use them. \$65 equals \$1.25 per week! Peanuts, surely! Most of those who criticize the fees and who are smokers or drinkers will gladly spend \$20 per week on their habit but to ask for \$1.25 to protect and improve their hobby is "daylight robbery". What hypocrites!

The stark reality of the situation is that one cannot expect 1990's services and benefits at 1970's prices! After all, the same standard of car which cost me \$4000 in 1975 now costs \$25000! So because cars are now so costly will I give them up and walk? Of course not!

And for any amateur who has anything from \$1000 to \$10000 worth of equipment in his shack and who can't honestly afford \$1.25 per week to be a WIA member, I'm sorry to say, it is time for him or her to sell up and take up picking up sea shells for a hobby.

On a more positive note, I, personally, would like to see WIA membership fees as an automatic part of annual licence fees. Thus every licensed amateur would be a WIA member. All would enjoy the many benefits, assistance and protection, legal and otherwise, necessary in this time of over-zealous Councils and regulating bodies. With such a system and the subsequent increase in member numbers, the per member cost would be

significantly reduced, possibly to the \$40 area. Thus, plus the annual licence fee could still be below \$65, our magical \$1.25 per week, a sum which, to my mind, is readily affordable by anyone. I fully appreciate the possible complications of this idea but I am sure that such complications are not insurmountable. Such a system would produce a stronger liaison with DOTS and a much healthier radio communications system overall.

To "Amateur Radio" readers, this epistle may well be wasted as most are already WIA members. Maybe these points could be conveyed to all those amateurs who are not as yet members. I hope that common decency, the Aussie spirit of a "fair go", and the manly (person-ly?) trait of shouldering one's responsibilities will see a huge increase in membership and genuine sharing of the load into the 1990's.

In conclusion, it will be very apparent that WIA membership means enough to me to put apathy aside and take up my pen in support of an excellent organization, the sole concern of which is the protection and improvement of the marvellous hobby which we all hold so dear.

DONALD A THORNLEY VK5NOD

MEMBERSHIP NO 232394

14 ANTHONY STREET MOUNT GAMBIER

\*\*\*\*\*

## Packet Comment

I read with interest the contribution by Peter Broughton in the December issue of Amateur Radio, "An Introduction to Packet Radio". The Packet Radio mode is increasingly popular with amateurs both in Australia and overseas. Australian amateurs are well versed in the latest technology and in some cases advancing it. So it is appropriate that more information should be published to keep amateurs informed as to the latest developments.

However I would like to make one comment on Peter's article. He says that an IBM compatible computer is essential to use the system "to present day standards". That is not strictly correct. If he is referring to the fact that Yapp software will only run on an IBM compatible, I can tell your readers that an even more advanced program - GEEPAK Ver 1.30 - will do all that the IBM compact/Yapp/TNC combination will do and more. It is designed to run with a Microbee disc-based computer including the "Computer in a Book"

and requires only a simple Beepak Modem to generate and demodulate the packet tones; it has dual port VHF/HF capability and all for less than half the cost of the IBM compact/YAPP/TNC set-up

I agree with Peter that it is most desirable to join a user group to get a proper introduction to Packet and to keep in touch with all the latest developments. In this regard I would mention the Australian Amateur Packet Radio Association (AAPRA), an entirely voluntary association which has pioneered many of the Packet Radio developments in Australia. AAPRA introduced the popular C=PAK modems with software TNC-emulation for the Commodore family of PCs and the BEEPAC package for the Microbes. It is a convenient source of imported TNC's. Any surplus from these transactions is used to purchase equipment for supply without cost. To Club to establish digpeakers on strategic mountain tops and in metropolitan areas.

AAPRA has about 400 active members in all Australian states as well as overseas; it publishes an information sheet, DIGIPEAT, to keep members informed of the latest developments in packet radio world wide, including equipment mods. It does not operate any BBS or mailboxes — there are more than enough of those already — but in introducing data highways on UHF, and the ROSE networks, it will hopefully make life easier for the average packet operator.

So if you are interested in the broader picture and latest in Packet, contact AAPRA at the address below.

**JOHN JEFFERYS VK2CFJ**

**HON SEC AAPRA**

**69 WESTBROOK AVE WAHROONGA**

**NSW**

## **CB, Amateur, "Ham" and PR**

It was gratifying to note the quick response by the WIA and many amateurs to the erroneous statements made on a recent "Investigators" programme on ABC TV (7/11/89).

However, while the media and the general public still remain confused by the difference between Amateur Radio and Citizen's Band radio, may I offer the following considerations.

As Amateur Radio operators we must first put our own house in order if we are to clear up this confusion

This could be best done by more energetic publicity from the WIA through Divisions and Clubs to the individual amateur, explaining the differences between the two services to the media and the public

Another point of confusion exists with the use of the ridiculous appellation, "HAM"

Since very few of us wish to be classified as a "Lump of Pork" or a "Mug Actor", it should

be completely eradicated!

Likewise, "HAM Radio" sounds like a pig farmer's communication network!

A standard R/T voice procedure for amateurs has been in existence for many years. We should use it, NOT the "long winded" and often incorrect CB jargon. The "Q" code was intended for CW NOT phone; in any case some newcomers misuse it — QRX does NOT mean wait and the proverb ROGER should be used instead of QSL (no thanks, I don't want a card!).

Clubs should appoint a publicity officer to keep the local media informed of the club's aims and activities, and thus will assist in attracting new members.

When amateurs assist in civil emergency operations, these events must be publicised, BUT ONLY responsible WICEN officers should deal with the media and then in the form of press release statements which are NOT to be altered (blue pencils banned!).

As licensed radio operators we should operate our stations according to the Regulations and above all with a friendly and courteous regard for the rights of others.

**TED GABRIEL VK4YG**

**PO BOX 245 RAVENSHOR 4872**

## **VCR TVI**

I am experiencing a serious TVI problem concerning VCR's, and I wonder if a reader of AR may be able to help me.

The situation is as follows:

A. My transmitter has a maximum CW output of 100 watts. My antenna is a five-band trap vertical in ground-plane configuration. SWR no greater than 2.1 on bands on which I operate.

B. I cause no TVI whatsoever on any TV channel/Ham band combination, when receiving TVI direct or when using my VCR as the TV tuner.

C. Nor do I create TVI problems when recording on the VCR (ie, the VCR recording is "clean").

D. However, when playing back any tape through the VCR I cause TVI at TX output levels as low as 5 to 10 watts. 10 metres is clear of the problem, but the situation worsens with TVI on 80 metres being the worst.

I have tried two low-pass filters in the TX coax with absolutely no reduction of the problem. (I did not believe it would anyway.) I have tried high-pass filters at the TV antenna input. Still no change. Also wrapping the TV coax several times through a large ferrite core achieved nothing. Neighbours' VCRs are also affected. I hope this is a common problem and someone out there has the cure. If so, please let me know the antidote.

**RAY TURNER VK2COX**

**6/276 BUNNORONG RD**

**HILLSDALE 2036**

## **Result Of Theft**

In September I was unfortunate enough to have my rig and computer (Commodore 128D) stolen. I thus have a problem in that I have on disk all my contacts (about 250) and cannot access them

If there is some kind person out there who owns a "128" and a printer, who would be willing to print out the list of contacts, I would be happy to pay the kind Samaritan or donate some 128 software and other goodies

**BOB ROSS-WILSON VK2FIT**

**111 JAMES ST LEICHHARDT 2040**

**PHONE 02 339 8111 (W)**

**02 550 0130 (H)**

## **QSL Cards**

In reply to Neil Penfold's letter in AR of Nov 1989, you are not the only one Neil, I have sent out cards direct with SAE and ample return postage and have had the cards returned via the bureau or not at all.

I just don't collect cards to put them in a shoe box. If I need a card for a particular prefix, zone or country be it for WAZ, DXCC or some other award, whenever possible or convenient I ask if the station QSLs and if the answer is yes, I mail a card direct with SAE and return postage, and that in some cases is the last I hear or see of it.

It is becoming very obvious that some stations are only interested in green stamps and IRCs and once received the card and SAE finish up in the WPB. I chased zone 23 for nine years and finally worked 3 stations. I was lucky to receive a card back from a young lad (17 years old) who was working the club station (JT1KAA) after 4 months, the other 2 have been outstanding for 9 months now (just as well I did not hold my breath) and still not received. One had IRCs and a green stamp for return postage

There are several Russian states as well as a few others where QSLing is a big disappointment. So much for the well used phrase of 100% QSL. Also a kingsize brickbat to operators who take between 9 and 12 months to send their logs to their managers

I won't worry about going for awards any more and I will still QSL but it will be on RECEIPT only unless it is for a DXpedition or a new country, and by the way I too am a little pistol

**BILL VOGEL VK5NVW**

**16 WANDILLA STREET LARGS NORTH**

**NSW**

## **VNG Replies . . .**

DH Watkins VK2DDR (AR Jan 1990, page 60) said that he has not seen a single benefit detailed which supports the reintroduction of VNG. In my VNG update, I did outline the sort of people who use VNG, but maybe I

should go through the exercise again.

First however, let's examine its worth in true government fashion by counting the number of contributors who were prepared to dip into their own pockets to resuscitate VNG and to keep it running. Since the VNG Users Consortium came into being in late February 1988 a total of seventy different contributors (organisations, clubs, societies and private individuals) have given the sum of \$12586 altogether. They include a number of radio amateurs and short wave listeners, and I don't think I need to spell out the use to these groups of standard frequency and time signal services!

Another very important use of VNG is in earthquake seismology. Over 40 seismographs (earthquake recorders) in Australia rely on it to keep their clocks accurately on time so that we can determine the locations of earthquakes. The recent Newcastle earthquake demonstrates to eastern Australians the relevance of this occupation. Western Australians have already had two towns wrecked by earthquakes. We need earthquake assessments so we can build safer buildings. The assessments must be based on good data.

Astronomers are also major users of VNG

for timing occultations and for telescope pointing calculations. About 80 Australian amateur astronomers use it for their unpaid work which contributes to international science.

Other users include some radio stations, surveyors, navigators, geophysicists studying the earth's magnetic field, and electric power networks.

AUSLIQ informs me that \$12000 has also been pledged or contributed to it since its letter went out last June.

By the way, it is also relevant that VNG only broadcasts for nine out of 24 hours on 10 and 15 MHz. This gives people a clear run of 15 hours each day to glean whatever information they want from WWW/WWVH.

**MARION LEIBA (DR) VK1VNG,  
VK1KNG  
HONORARY SECRETARY  
VNG USERS CONSORTIUM**

## 2m Intruders In SE Asia

Re Ian Berwick's (VK3ALZ) item in "Over to You" in Dec AR, I wish to point out the

following. Having been to Indonesia 5 times in the last 15 months, I have observed that the use of Icom 2 metre hand helds by all types of authorities, including the Police is prolific. Literally millions of 2 metre hand helds are in use there by non amateurs.

As for HF, they use any frequency they like, especially the international amateur bands. South East Asia is and always will be South East Asia, and despite assurances by their governments, they will do nothing about it. I'm afraid, old man, we are going to have to live with the interference, and there is nothing we can do about it. As for use of 2 metre hand helds, I'm sure we can say it won't affect us, but what about 10 million hand helds on 2 m jamming the satellites? When I was in Singapore once, many shops had literally hundreds of Icom IC2A hand helds, selling them as walkie talkies to parents for use by their kids.

I think Intruder Watch has a problem as big as someone trying to stop the waves in the ocean.

**BARRY McNEIL VK2FPF  
3 BELLA VISTA ST  
HEATHCOTE 2233**

## HF PREDICTIONS

**ROGER HARRISON VK2ZTB  
THE APOGEE GROUP**

Welcome to AR's new HF Predictions column. I trust readers find the information presented here not only useful, but interesting, too.

For ease of use and to accommodate space restrictions in the magazine, I have provided predictions applicable for three major regions of Australia:

**VK EAST.** Covers the major part of NSW and Queensland

**VK SOUTH.** Covers southern-NSW, VK3, VK6 and VK7

**VK WEST.** Covers the south-west of West Australia

For each of these regions I have selected six "terminals" to major continental regions of the world, or regions of particular interest, such as Australian Antarctica (VK ANTARC TIC). From time to time, I will include predictions to cover particular DXpeditions or other activities of special interest. This month, as there is to be a DXpedition to Bouvet Island in the south Atlantic during the early part of the month I have included predictions for Bouvet.

Feedback from readers and users would be most appreciated - let me know what you feel is wrong, and what's right, about the paths,

presentation or any other aspect.

## THE CHARTS

These charts are different from those you see published elsewhere, and arguably more useful to the amateur fraternity as they give, effectively, the predicted signal/noise ratio for each hour and for selected bands.

The charts are organised in 24 rows, one for each hour UTC (first column on the left). Don't forget to add the appropriate number of hours for your time zone, including daylight saving where it applies. The next column gives the MUF (maximum usable frequency) for each hour, followed by the field strength at the MUF, in decibels referred to 1  $\mu\text{V}/\text{metre}$  (dBu). The column marked FOT gives the "optimum" frequency - the most reliable frequency for the path.

Then come five columns, one for each of five selected HF bands.

The numbers in the column represent predicted field strength at each hour in decibels referred to 1  $\mu\text{V}/\text{metre}$ . Here it represents "raw" signal to noise ratio as urban noise levels are typically 1-2  $\mu\text{V}/\text{metre}$ , but does not take into account the advantage offered by particular transmission modes. The results are based on a transmitter power of

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100 W output, the use of modest 3-element beams or similar, and for "median" conditions. Where the results fall below -40 dB, no output is printed.

Enhanced conditions may improve S/N ratios by 9-15 dB. The use of CW or digital transmission modes show better results than SSB. If you've got 400 W output, you get a 6 dB improvement. Where conditions warrant it, I have deleted 28.5 MHz predictions and included 10.1 MHz. I general, providing predictions for the bands below 10 MHz is futile during this part of the solar cycle, except perhaps where DXpeditions are concerned.

The Bouvet Island predictions are different, being based on dipole antenna systems and they cover the bands scheduled to be activated. The predictions are calculated using a program known as "FTZ", for IBM and compatibles, distributed by FT Promotions (02) 818-4838.

*Please turn over for charts*

UTC	MUF	DMU	FOF	14.2	18.1	21.2	24.9	28.5
1	18.2	-7	12.7	-14	-7	-7	-38	-17
2	21.0	-6	15.1	-10	-6	-6	-10	-10
3	20.5	-6	15.7	-10	-6	-6	-7	-9
4	23.5	-6	19.9	-11	-7	-7	-7	-7
5	28.3	-6	24.9	-11	-7	-7	-7	-7
6	29.1	-6	26.4	-11	-7	-7	-7	-7
7	29.0	-6	26.3	-11	-7	-7	-7	-7
8	28.1	-6	25.4	-11	-7	-7	-7	-7
9	27.8	-6	25.3	-11	-7	-7	-7	-7
10	26.0	-6	23.2	-10	-6	-6	-4	-4
11	24.1	-5	21.3	-9	-5	-5	-3	-3
12	22.1	-5	19.4	-8	-4	-4	-2	-2
13	20.8	-5	18.2	-7	-3	-3	-1	-1
14	19.6	-4	16.5	-5	-2	-2	0	0
15	18.7	-4	15.4	-4	-1	-1	0	0
16	18.0	-4	14.0	-3	-1	-1	0	0
17	17.1	-4	13.2	-3	-1	-1	0	0
18	16.4	-4	12.5	-3	-1	-1	0	0
19	16.0	-4	12.1	-3	-1	-1	0	0
20	16.8	-4	12.5	-3	-1	-1	0	0
21	15.8	-4	10.9	-2	-1	-1	0	0
22	15.3	-4	10.4	-2	-1	-1	0	0
23	15.0	-4	10.4	-2	-1	-1	0	0
24	16.0	-4	11.1	-2	-1	-1	0	0

**VK EAST — AFRICA**

UTC	MUF	DMU	FOF	14.2	18.1	21.2	24.9	28.5
1	17.3	-5	11.9	-10	-5	-5	-13	-12
2	20.3	-4	14.5	-15	-5	-5	-7	-13
3	20.1	-7	15.2	-14	-10	-10	-6	-7
4	22.7	-7	17.1	-14	-10	-10	-6	-7
5	26.6	-4	18.8	-9	-8	-8	-4	-6
6	28.9	-4	19.1	-9	-8	-8	-4	-6
7	26.7	-7	18.9	-11	-12	-12	-7	-7
8	26.4	-7	18.7	-11	-12	-12	-7	-7
9	25.3	-7	18.1	-10	-10	-10	-7	-7
10	23.8	-6	16.8	-10	-10	-10	-6	-6
11	22.0	-6	15.4	-9	-9	-9	-6	-6
12	20.6	-5	14.3	-7	-7	-7	-5	-5
13	19.2	-4	12.9	-6	-6	-6	-4	-4
14	17.8	-4	11.5	-5	-5	-5	-3	-3
15	16.7	-4	10.8	-5	-5	-5	-3	-3
16	14.7	-3	10.2	-4	-4	-4	-2	-2
17	14.3	-3	10.0	-4	-4	-4	-2	-2
18	14.0	-3	9.9	-4	-4	-4	-2	-2
19	14.0	-3	9.9	-4	-4	-4	-2	-2
20	15.9	-4	10.6	-5	-5	-5	-3	-3
21	15.9	-4	10.6	-5	-5	-5	-3	-3
22	14.6	-4	10.2	-5	-5	-5	-3	-3
23	14.3	-4	10.0	-5	-5	-5	-3	-3
24	15.2	-4	10.8	-5	-5	-5	-3	-3

**VK STH — AFRICA**

UTC	MUF	DMU	FOF	14.2	18.1	21.2	24.9	28.5
1	18.5	-5	13.9	-3	-3	-3	-5	-14
2	15.1	-2	11.2	-1	-1	-1	-2	-2
3	23.9	-2	18.8	-4	-2	-2	-1	-2
4	26.2	-2	22.2	-4	-2	-2	-1	-2
5	23.9	-2	20.3	-4	-2	-2	-1	-2
6	31.4	-1	25.8	-3	-3	-3	-1	0
7	30.9	-2	25.1	-3	-3	-3	-1	-2
8	30.9	-2	25.1	-3	-3	-3	-1	-2
9	30.2	-2	24.6	-3	-3	-3	-1	-2
10	29.4	-2	23.8	-3	-3	-3	-1	-2
11	27.9	-2	22.0	-3	-3	-3	-1	-2
12	26.1	-1	20.3	-2	-2	-2	-1	-1
13	24.2	-1	18.6	-1	-1	-1	-1	-1
14	22.2	-1	16.7	-1	-1	-1	-1	-1
15	20.3	-1	14.8	-1	-1	-1	-1	-1
16	18.5	-1	12.9	-1	-1	-1	-1	-1
17	17.8	-1	12.5	-1	-1	-1	-1	-1
18	16.1	-1	11.4	-1	-1	-1	-1	-1
19	15.3	-1	10.3	-1	-1	-1	-1	-1
20	16.6	-1	12.7	-1	-1	-1	-1	-1
21	16.7	-1	12.8	-1	-1	-1	-1	-1
22	17.3	-1	13.4	-1	-1	-1	-1	-1
23	17.8	-1	14.0	-1	-1	-1	-1	-1
24	17.4	-1	13.7	-1	-1	-1	-1	-1

**VK WEST — AFRICA**

UTC	MUF	DMU	FOF	14.2	18.1	21.2	24.9	28.5
1	20.6	-3	21.1	-23	-5	-2	5	5
2	23.1	-3	23.5	-24	-6	-3	4	4
3	25.5	-3	26.1	-24	-7	-3	4	4
4	27.2	-3	27.7	-25	-1	-1	4	4
5	30.8	-4	30.3	-22	-4	-3	5	5
6	30.2	-4	29.7	-16	-1	-1	5	5
7	27.1	-3	27.7	-8	-4	-2	8	8
8	28.0	-3	27.3	-4	-1	-1	7	7
9	28.9	-3	27.8	-19	-10	-14	8	8
10	28.0	-3	27.0	-22	-12	-13	8	8
11	24.9	-3	23.9	-26	-13	-19	12	12
12	24.7	-3	23.9	-27	-14	-19	12	12
13	24.6	-3	23.8	-27	-14	-19	12	12
14	24.5	-3	23.7	-27	-14	-19	12	12
15	22.0	-4	21.7	-28	-15	-20	13	13
16	20.7	-4	20.4	-27	-15	-20	13	13
17	20.7	-4	20.4	-27	-15	-20	13	13
18	18.0	-4	18.0	-23	-12	-14	-5	-24
19	18.0	-4	18.0	-23	-12	-14	-5	-24
20	18.0	-4	18.0	-23	-12	-14	-5	-24
21	20.3	-3	20.3	-13	-11	-13	-3	-14
22	21.8	-3	21.8	-1	-9	-10	8	8
23	21.8	-3	21.8	-1	-9	-10	8	8
24	20.0	-3	20.0	-12	-2	-4	6	5

**VK EAST — ASIA**

UTC	MUF	DMU	FOF	14.2	18.1	21.2	24.9	28.5
1	30.1	-3	28.6	-28	-6	-3	3	3
2	31.7	-2	29.8	-32	-10	-2	3	3
3	30.7	-2	29.5	-32	-11	-2	3	3
4	31.6	-2	29.1	-32	-11	-2	3	3
5	33.0	-2	32.5	-29	-9	-3	3	3
6	30.7	-2	29.1	-26	-6	-1	4	4
7	30.9	-2	29.4	-5	-5	-1	4	4
8	28.9	-2	27.5	-5	-6	-6	8	8
9	27.5	-2	26.2	-7	-19	-13	8	8
10	25.8	-1	24.8	-24	-22	-12	12	12
11	24.2	-1	23.4	-25	-22	-17	12	12
12	22.5	-1	21.7	-29	-25	-15	-4	-4
13	21.6	-1	20.7	-29	-25	-15	-4	-4
14	20.8	-1	19.6	-24	-20	-12	-8	-8
15	20.0	-2	18.5	-24	-17	-9	-15	-15
16	19.1	-2	17.5	-20	-15	-6	-20	-20
17	18.3	-2	16.4	-17	-12	-5	-19	-19
18	17.3	-2	15.3	-13	-9	-1	-16	-12
19	16.6	-2	14.6	-10	-6	-4	-17	-17
20	17.4	-1	15.1	-7	-3	-3	-16	-16
21	20.2	-7	15.1	-14	-13	-9	-4	-15
22	24.6	-4	18.7	-3	-6	-3	-3	-3
23	26.5	-3	20.0	-1	-5	-1	-6	-6
24	30.6	-3	24.0	-22	-6	-2	4	4

**VK STH — ASIA**

UTC	MUF	DMU	FOF	14.2	18.1	21.2	24.9	28.5
1	28.7	-3	22.7	-17	-2	-3	5	3
2	29.0	-2	23.3	-22	-6	-2	4	3
3	29.5	-2	24.1	-24	-6	-1	3	3
4	32.7	-2	27.7	-22	-7	-2	4	4
5	35.9	-3	34.7	-24	-6	-1	4	4
6	35.9	-3	34.7	-24	-6	-1	4	4
7	35.9	-3	34.7	-24	-6	-1	4	4
8	35.9	-3	34.7	-24	-6	-1	4	4
9	35.9	-3	34.7	-24	-6	-1	4	4
10	35.9	-3	34.7	-24	-6	-1	4	4
11	35.9	-3	34.7	-24	-6	-1	4	4
12	35.9	-3	34.7	-24	-6	-1	4	4
13	35.9	-3	34.7	-24	-6	-1	4	4
14	35.9	-3	34.7	-24	-6	-1	4	4
15	35.9	-3	34.7	-24	-6	-1	4	4
16	35.9	-3	34.7	-24	-6	-1	4	4
17	35.9	-3	34.7	-24	-6	-1	4	4
18	35.9	-3	34.7	-24	-6	-1	4	4
19	35.9	-3	34.7	-24	-6	-1	4	4
20	35.9	-3	34.7	-24	-6	-1	4	4
21	35.9	-3	34.7	-24	-6	-1	4	4
22	35.9	-3	34.7	-24	-6	-1	4	4
23	35.9	-3	34.7	-24	-6	-1	4	4
24	35.9	-3	34.7	-24	-6	-1	4	4

**VK WEST — ASIA**

UTC	MUF	DMU	FOF	14.2	18.1	21.2	24.9	28.5
1	13.1	-28	9.5	-20	-15	-17	-26	-38
2	11.7	-27	8.0	-8	-8	-8	-26	-36
3	11.4	-27	7.9	-8	-8	-8	-26	-36
4	11.4	-27	7.9	-8	-8	-8	-26	-36
5	11.4	-27	7.9	-8	-8	-8	-26	-36
6	11.4	-27	7.9	-8	-8	-8	-26	-36
7	11.4	-27	7.9	-8	-8	-8	-26	-36
8	11.4	-27	7.9	-8	-8	-8	-26	-36
9	11.4	-27	7.9	-8	-8	-8	-26	-36
10	11.4	-27	7.9	-8	-8	-8	-26	-36
11	11.4	-27	7.9	-8	-8	-8	-26	-36
12	11.4	-27	7.9	-8	-8	-8	-26	-36
13	11.4	-27	7.9	-8	-8	-8	-26	-36
14	11.4	-27	7.9	-8	-8	-8	-26	-36
15	11.4	-27	7.9	-8	-8	-8	-26	-36
16	11.4	-27	7.9	-8	-8	-8	-26	-36
17	11.4	-27	7.9	-8	-8	-8	-26	-36
18	11.4	-27	7.9	-8	-8	-8	-26	-36
19	11.4	-27	7.9	-8	-8	-8	-26	-36
20	11.4	-27	7.9	-8	-8	-8	-26	-36
21	11.4	-27	7.9	-8	-8	-8	-26	-36
22	11.4	-27	7.9	-8	-8	-8	-26	-36
23	11.4	-27	7.9	-8	-8	-8	-26	-36
24	11.4	-27	7.9	-8	-8	-8	-26	-36

**VK EAST — EUROPE S**

UTC	HRF	DBU	FOY	14.2	18.1	21.2	24.9	28.5	UTC	HRF	DBU	FOY	18.1	14.2	21.2	24.9	28.5	UTC	HRF	DBU	FOY	14.2	18.1	21.2	24.9	28.5
1	24.6	13 18.9	9	23	15	14	13		1	16.5	-2 13.3	-23	-4	-2	-6	-14		1	17.0	8 13.6	-2	0	-3	-11	-20	
2	24.7	14 22.0	5	14	16	15	13		2	17.2	-2 13.9	-27	-5	-8	-12		2	15.1	-12 11.6	-14	-9	-16	-22	-31		
3	24.8	14 21.4	5	15	16	15	13		3	17.6	-2 14.2	-20	-6	-9	-10		3	14.3	-21 11.0	-22	-19	-14	-22	-31		
4	25.0	15 21.3	10	16	17	15	11		4	17.8	-2 14.5	-29	-6	-3	-10		4	18.2	-16 16.1	-31	-18	-13	-14	-18		
5	25.4	16 10.7	16	19	19	16	13		5	17.7	-1 14.1	-28	-6	-1	-10		5	25.0	-8 19.7	-11	-11	-13	-17	-24		
6	24.4	17 10.5	20	22	21	17	13		6	17.8	0 14.4	-35	-4	0	-9		6	17.9	-6 25.3	-11	-11	-13	-17	-24		
7	23.1	21 19.4	20	27	24	18	10		7	18.0	1 14.5	-32	-2	1	-8		7	13.5	-2 26.3	-11	-11	-13	-17	-24		
8	22.1	22 17.9	32	28	24	16	8		8	18.2	2 14.6	-16	1	3	0		8	13.2	-2 25.7	-11	-11	-13	-17	-24		
9	20.9	23 16.4	32	28	22	6			9	18.3	3 14.5	-7	6	2	-6		9	12.5	-2 25.8	-11	-11	-13	-17	-24		
10	19.6	24 15.7	32	24	20	13	0		10	18.4	10 14.6	5	13	10	5	-4		10	11.3	-2 25.5	-11	-11	-13	-17	-24	
11	19.0	24 15.2	32	26	19	9	-2		11	18.1	13 14.6	16	18	13	6	-4		11	28.9	-1 24.8	-17	-7	-9	-2	-1	
12	18.4	24 14.6	32	25	17	7	-8		12	17.6	15 13.5	34	21	13	9	-7		12	28.3	22.8	-24	-7	1	2	1	
13	17.9	25 14.3	32	23	15	4	-8		13	16.9	16 12.4	25	20	10	0	-14		13	26.7	9 21.4	-6	4	6	3	3	
14	16.7	25 13.1	32	20	12	0	-13		14	16.0	13 11.3	16	18	6	-5	-22		14	26.4	12 19.4	-22	20	17	11	4	
15	15.9	25 12.0	32	19	10	-4	-17		15	15.1	13 10.6	16	18	6	-5	-22		15	24.6	12 19.4	-22	20	17	11	4	
16	14.9	25 11.5	32	17	6	0	-23		16	14.5	14 10.3	26	15	1	-14	-33		16	23.7	13 18.7	25	21	17	11	3	
17	14.2	26 10.9	36	14	3	-12	-28		17	13.6	14 9.7	24	12	-4	-30	-11		17	22.9	13 18.6	26	21	17	11	3	
18	14.3	24 11.1	36	14	4	-10	-25		18	13.4	14 9.6	26	13	-6	-30	-11		18	21.8	14 17.0	26	21	15	7	-2	
19	16.7	18 12.9	20	15	9	-2	-14		19	13.2	10 9.5	33	10	-7	-24	-11		19	20.8	14 16.1	25	19	13	5	-5	
20	16.1	15 15.5	15	16	14	8	-1		20	13.2	15 9.9	23	11	-5	-21	-11		20	19.4	14 15.1	24	17	11	1	-9	
21	22.5	14 18.2	11	16	16	13	7		21	12.5	7 9.0	5	6	-5	-17	-25		21	18.8	15 14.3	23	16	9	-1	-13	
22	25.1	14 19.9	8	15	16	14	10		22	14.0	2 11.0	-4	3	-4	-13	-28		22	19.5	14 14.8	24	17	11	1	-10	
23	25.9	13 20.4	6	14	15	14	10		23	14.7	-1 11.1	-12	-1	-4	-11	-25		23	23.2	12 14.1	23	18	14	7	-2	
24	24.4	17 20.9	9	15	16	13	11		24	15.7	-3 12.6	-19	-2	-3	-8	-18		24	20.4	15 15.0	10	9	6	-1	-10	

VK EAST — STH PACIFIC

VK STH — VK ANTARCTIC

VK WEST — MEDITERRANEAN

UTC	HRF	DBU	FOY	1.8	3.6	7.1	14.2	21.2	UTC	HRF	DBU	FOY	1.8	3.6	7.1	14.2	21.2	UTC	HRF	DBU	FOY	1.8	3.6	7.1	14.2	21.2
1	13.6	-24 19.2	...	...	...	...	-23	-21	1	14.1	-17 10.7	...	...	...	...	-17	-17	1	14.0	-12 16.0	...	...	...	...	-12	-17
2	13.4	-29 19.2	...	...	...	...	-25	-22	2	13.8	-21 10.6	...	...	...	...	-20	-19	2	13.7	-10 16.2	...	...	...	...	-14	-19
3	13.1	-32 19.0	...	...	...	...	-23	-21	3	14.7	-20 11.4	...	...	...	...	-22	-16	3	14.7	-20 11.1	...	...	...	...	-21	-16
4	14.0	-31 10.8	...	...	...	...	-20	-20	4	14.4	-19 11.2	...	...	...	...	-26	-12	4	14.4	-19 11.0	...	...	...	...	-21	-12
5	11.6	-27 12.1	...	...	...	...	-35	-16	5	14.5	-16 14.7	...	...	...	...	-28	-11	5	14.6	-16 14.4	...	...	...	...	-21	-13
6	17.4	-22 14.6	...	...	...	...	-13	-13	6	14.4	-16 15.2	...	...	...	...	-29	-10	6	14.5	-16 14.4	...	...	...	...	-22	-14
7	17.8	-20 14.4	...	...	...	...	-35	-12	7	14.5	-15 15.3	...	...	...	...	-29	-10	7	14.6	-16 14.4	...	...	...	...	-21	-11
8	18.0	-18 14.5	...	...	...	...	-12	-13	8	14.7	-14 15.3	...	...	...	...	-28	-9	8	14.6	-16 14.4	...	...	...	...	-21	-11
9	18.1	-15 14.4	...	...	...	...	-14	-8	9	15.0	-12 15.4	...	...	...	...	-24	-8	9	14.7	-14 15.3	...	...	...	...	-21	-11
10	18.2	-11 14.4	...	...	...	...	-20	-7	10	15.0	-10 15.3	...	...	...	...	-19	-6	10	14.8	-14 15.3	...	...	...	...	-21	-11
11	17.8	-9 14.1	...	...	...	...	-14	-5	11	15.2	-6 15.4	...	...	...	...	-14	-4	11	14.9	-14 15.3	...	...	...	...	-21	-11
12	17.5	-8 13.7	...	...	...	...	-13	-6	12	14.9	-6 16.2	...	...	...	...	-11	-4	12	14.9	-14 15.3	...	...	...	...	-21	-11
13	16.7	-7 13.0	...	...	...	...	-10	-5	13	15.2	-5 12.0	...	...	...	...	-8	-4	13	15.2	-14 15.3	...	...	...	...	-21	-11
14	16.1	-6 12.4	...	...	...	...	-7	-7	14	15.0	-6 11.9	...	...	...	...	-7	-4	14	15.0	-14 15.3	...	...	...	...	-21	-11
15	15.4	-4 11.9	...	...	...	...	-8	-8	15	15.4	-4 11.5	...	...	...	...	-20	-4	15	15.4	-14 15.3	...	...	...	...	-21	-11
16	14.8	-2 11.3	...	...	...	...	-25	-10	16	15.3	-3 10.9	...	...	...	...	-17	0	16	15.3	-14 15.3	...	...	...	...	-21	-11
17	14.4	2 11.7	...	...	...	...	-4	-2	17	14.3	2 10.2	...	...	...	...	-5	2	17	14.4	2 11.0	...	...	...	...	-21	-11
18	14.3	4 10.9	...	...	...	...	-5	-18	18	14.1	5 10.2	...	...	...	...	6	5	18	14.3	4 10.9	...	...	...	...	-21	-11
19	13.7	7 10.6	...	...	...	...	-9	-10	19	13.9	6 10.3	...	...	...	...	0	6	19	14.4	7 10.6	...	...	...	...	-21	-11
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21	11.4	-7 10.7	...	...	...	...	-37	-5	21	14.4	1 11.3	...	...	...	...	-14	1	21	11.4	-7 10.7	...	...	...	...	-21	-11
22	14.0	-13 11.1	...	...	...	...	-13	-15	22	14.4	-4 11.0	...	...	...	...	-34	-4	22	14.4	-4 11.0	...	...	...	...	-21	-11
23	14.7	-16 11.2	...	...	...	...	-17	-14	23	14.8	-9 11.5	...	...	...	...	-10	-11	23	14.7	-16 11.2	...	...	...	...	-21	-11
24	14.4	-20 10.9	...	...	...	...	-21	-17	24	14.3	-14 10.8	...	...	...	...	-14	-16	24	14.3	-14 10.8	...	...	...	...	-21	-11

VK EAST — BOUVET IS. VK STH — BOUVET IS. VK WEST — BOUVET IS.

## Solution To Morseword No.35

Across: 1 viz. 2 cap 3 Wang 4 seal 5 image 6 sing 7 kale 8 start 9 years 10 stunt

Down: 1 Lear 2 eases 3 warm 4 dram 5 fits 6 wore 7 dry 8 monk 9 wins 10 soft

	1	2	3	4	5	6	7	8	9	10
1	.	.	.	.	.	.	.	.	.	.
2	.	.	.	.	.	.	.	.	.	.
3	.	.	.	.	.	.	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.
5	.	.	.	.	.	.	.	.	.	.
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9	.	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.	.

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IC228A



IC2400A

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